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SAFETY ENGINEERING

PREVENTION OF NEEDLESS WASTE BY FIRES AND ACCIDENTS

VOLUME XXXIII

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Burning of the Plant of the Canadian Car and Foundry Company, Kingsland, N. J., on January 11. The Fire Started in a Storehouse Filled with Munitions. The Photograph Shows the Great Volume of Smoke and the Bursting of Shells

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Sight-Saving in the Industries

A New Exhibit Prepared by The National Committee for the Prevention of Blindness

Editorial Note: A noteworthy series of panels with profuse color illustrations in oil, devoted to the chief hazards to eyesight as found in the industries of this country, has recently been brought out by The National Committee for the Prevention of Blindness. As there have been certain unique features in the building of this exhibit, and in the methods adopted to insure a wide distribution of reproductions, SAFETY ENGINEERING *has asked Mr. Gordon L. Berry, Field Secretary of the Committee, who was in charge of its development, to prepare an article relating to its production and use.*

THE five illustrations shown on the pages following, reproduce the most recent educational endeavor for sight-saving among workers in the industries. Their publication should not be considered indicative of the establishment of any new organization to engage in safety work, but rather as the specialized contribution of a committee whose efforts are devoted to the control and eradication of all the chief causes of blindness, of which industrial accidents are, as is well known, among the most serious, and likewise preventable to a very great extent. It is the earnest hope of the committee that the organizations now devoting their entire efforts to safeguarding workers in the industries will find these exhibits of help in their own publicity and educational work.

The National Committee for the Prevention of Blindness is a purely philanthropic organization, maintained in part by the Russell Sage Foundation and the Rockefeller Foundation. The chief causes of preventable blindness and serious impairment of vision are: Ophthalmia neonatorum (popularly known as babies' sore eyes); trachoma (a disease of the eyelids); the drinking of wood alcohol, or the inhalation of its fumes in an inadequately ventilated place; the improper use of illumination, and industrial accidents.

There are today about 100,000 blind persons in the United States, of whom more than 50 per cent are needlessly blind. There are other thousands who must struggle through life with serious impairment of vision due to disease, accident or negligence, most of which might have been prevented or cured. Irrespective of the amount of human suffering caused, the loss of sight in whole or in part is responsible for a tremendous amount of actual money loss to the victims and to the country at large.

Any one of these chief causes of preventable blindness may at some time or other have to be considered in the home of any workman. There have been and are today in many sections of the United States, exceedingly serious outbreaks of trachoma. This disease, in certain of its stages, is extremely communicable and in many industrial centers where the sanitary conditions of the homes of the workers are not what they should be, where there is ignorance in regard to the care of the eyes and the prevention of the spread of communicable diseases, trachoma, if it obtains a foothold, is likely to spread until it becomes a veritable scourge.

It cannot as yet be said that there is universal knowledge among laymen regarding the care of the eyes of newborn babes, and the writer of this article has found that some of his most interested audiences have been made up of workingmen in shop meetings where they have learned for the first time of the dangers to the eyes of newborn babes from inflammation during the first few days after birth. Inflammation of the eyes of the new-born may result in total blindness within 48 hours unless the proper prophylactic treatment is provided. This one entirely preventable disease is responsible for the blindness of more than 10,-

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HE TOOK A CHANCE!

Largely because both employers and workmen take chances there are nearly

200,000 ACCIDENTS TO EYES

in United States industries every year

In one county in Ohio one eye is lost every eleven days

Do you know the methods for reducing hazards in your industry or your trade? Are you using them?

National Committee for the Prevention of Blindness
130 East 22nd St. New York.

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He may get the dirt or chip out but he also may start infection from his

SOILED HANDS
HANDKERCHIEF
DIRTY MATCH
OR TOOTHPICK

Then disease results and the eye may be lost

Dust, chips, etc. should be removed by the company doctor if there is one If not, your foreman should use only the first-aid kit

WIDEAWAKE <
EMPLOYERS provide proper aids
EMPLOYEES use them

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SOME INDUSTRIAL HAZARDS TO EYESIGHT

Flying sparks or splashing of molten metal

Flying bits from chipping castings and from using battered tools

Unprotected emery wheels

Injurious light rays and intense heat from high temperature welding

Steam, hot water or broken glass from bursting guage

Acid Burns and chemical explosions

ACCIDENTS FROM THESE CAUSES ARE PREVENTABLE

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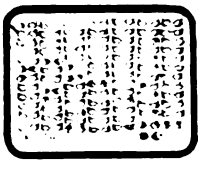
GOGGLES vs BLINDNESS

These men refused to be bothered with goggles

GOGGLES AND HELMETS

prevent injury to furnace men. welders, etc. exposed to intense heat and injurious light rays

These goggles saved the sight of ninety seven



men who thought their eyes were worth a little bother

YOU CAN SOON GET USED TO GOGGLES- BUT YOU CAN'T GET USED TO BLINDNESS!

National Committee for the Prevention of Blindness
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000 persons in the United States, and this year 20 per cent of the boys and girls who are attending our State schools for the blind are there because some physician or midwife failed to expend a few moments of time in administering the recognized prophylactic at the time of their birth.

Statistics are frequently quoted which cite the appalling and needless annual loss of life due to accidents in the industries of the United States. During recent years, the death list from such accidents has averaged from 30,000 to 40,000, while the tremendous total of approximately 2,000,000 non-fatal accidents each year, many of them leaving some permanent ill effect upon the health and efficiency of the victim, indicates the magnitude of the problems faced by those who are fighting to reduce this suffering and economic loss. As nearly as can be judged from statistics secured from various national, State, and local sources, from 8 to 10 per cent of all non-fatal accidents in the industries are accidents to the eyes. Those reported are often only those which have kept the victim from his work for a period of not less than a week. The loss in wages is almost unbelievable, amounting to millions of dollars annually, and it is surely self-evident that there is sufficient reason for continued strenuous efforts to prevent the needlessly high percentage of these accidents. It is probable that fully 50 per cent of all eye accidents might be prevented if the proper protective devices were installed by employers, and if the men in the ranks would do their part in using these devices, and stop "taking chances." Education both of the employers and employes is showing a marked influence in the growth of safety effort, and accident reduction.

The latest report (1910) of the Census Bureau puts the blind population of the United States at 57,272. It is admitted by the Director of the Census, and clearly demonstrated by those who have made subsequent investigations in individual States, that this considerably understates the actual number of blind persons in our country. There are probably more than 100,000 blind citizens.

Many interesting statements relative to the causes of blindness are made in the report referred to, however, and it is well worth while to note the conclusions drawn by the Director of the Census as regards industrial accidents, and blindness resulting therefrom. For instance, the 1910 figures show six times as many blind persons as were reported in 1850. The general population for 1910, on the other hand, is only four times greater than it was in 1850. Each decade, with the exception of the last, shows an increase over its predecessor in the numbers of our blind population. This, the director attributes in part, to the very rapid *industrial* development of the country with the consequent increase in industrial eye accidents and occupational eye diseases.

Furthermore, at each census in recent decades, the number of blind males has been considerably in excess of the number of blind females—nearly 30 per cent greater in 1910. This marked difference can not be attributed to a great preponderance of men in the general population, as there are but 106 males to every 100 females. Rather is it explained by the statisticians as due to the fact that "certain important causes of blindness, particularly injuries in mine explosions and other industrial accidents and wounds received in military service, are causes affecting the male population almost exclusively."

The period between 1880 and 1900 was one of great industrial growth in this country. It is significant that there was also a 30 per cent increase in blindness during those years. A large number of most interesting deductions might be drawn from the mass of statistical material provided by our latest census, but rather than entangle ourselves in a network of calculations, let the following brief summary suffice as the *raison d'être* for the consideration of this subject:

1. Of the 2,000,000 annual non-fatal accidents probably 200,000 are accidents to the eyes.
2. Approximately 10,000 persons in our country are blind today as

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Light glares in the workman's eyes

WRONG

RIGHT

The light belongs on the work

BAD LIGHTING

may permanently injure the sight of workers

lessens efficiency and reduces the output

greatly increases the chances of accident

GOOD LIGHTING

means sufficient light well distributed and without glare

Employers who do not provide good light are wasteful

Workers who use poor lighting are reckless

National Committee for the Prevention of Blindness
130 East 22nd St. New York.

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the result of accidental injury in industrial occupations.

3. It may cost the nation nearly $10,000,000 to care for these blinded artisans during the remainder of their lives.
4. The actual economic loss can not be estimated, and the loss to the unfortunate person whose eyesight is destroyed is least of all a matter of dollars and cents.

From these statements it is readily seen that one of the most important national problems of today is that of the protection of employes from accidents that will destroy or greatly impair vision.

Health exhibits on various causes of blindness have been prepared in recent years by this committee, and lately we have added a new exhibit devoted entirely to *Eye Accidents in the Industries*. A description of its five panels, with suggestions for the use of reproductions which have been prepared for general distribution in various forms and sizes, may be suggestive to those who are engaged in safety work.

The original panels of the new exhibit —"Eye Accidents in the Industries"— each measure 3 feet in width by 6 in height, and are perhaps the most striking and successful presentation of a subject of this nature that has ever been brought out. In the preparation of the exhibit the committee had the active cooperation of the Department of Surveys and Exhibits of the Russell Sage Foundation, and the advice of a number of safety directors of national reputation. While it has been, of course, impossible to include every hazard to eyesight, the most important ones are shown in picture and text that can not fail to impress the worker.

Those in charge of the building of the exhibit engaged the services of a clever artist, Mr. James Daugherty of New York, who has done many illustrations depicting various industrial activities for magazines and the press generally. After preliminary sketches had been reviewed, a series of vivid "pictures with a punch," in bright and attractive coloring, was evolved. The artist was most successful in reproducing the atmosphere of the work and the artisan, so that each picture strikes a responsive chord in the breast of the man in overalls. The original panels were shown for the first time at the recent annual National Safety Council Congress, held at Detroit, Mich. The panels in color are to be reserved in large part for such use at national meetings of various industrial and labor organizations. Their weight, when boxed, is around 400 pounds, and their use is, of course, necessarily limited to 30 or 40 conventions per annum. There is no charge for the loan of these originals, save for transportation (freight), and they have been in almost constant use since October 1, 1916.

Exhibits too frequently fail to reach the particular audience for which they are intended, due to this very fact. The committee, however, felt that the expense of preparation of the originals would not be justified unless some method of reproduction were used which would enable a nation-wide display of this educational material in the shops and factories where thousands of workers could view them. Consequently a preliminary edition of half-tone posters was issued, several thousand reproductions being made. The printing is on India-finish stock, each poster being in size approximately 18 by 36 inches. The 5 posters which comprise the set may thus be used over a period of as many weeks or months, or may be posted simultaneously on bulletin boards or in other prominent display places. Their use cannot but prove an effective addition to the ways and means of impressing workers with the necessity for taking every precaution to conserve that most precious of their sense organs—the eye.

The first poster of the series provides a striking picture-lesson in its depiction of an alert young workman before and after "taking a chance." The observer will not forget the well-drawn contrast.

The second is devoted entirely to that great menace to vision—the effort of a man to act as amateur first aid in removing a foreign substance from the eye of a comrade.

The third catalogues in 8 skillfully drawn illustrations the chief hazards to eyesight in the industries. Flying sparks or splashing of molten metal, the dangers

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in the process of chipping of metals, or in quarries and stone-works, the oft-mentioned burred edges of too-well-worn tools, the unprotected emery wheel, the possibility of burns to the delicate tissues of the eyes by improper protection when engaged in modern processes of high-temperature welding, cuts and burns from broken glass, steam and hot water from a bursting gauge, and lastly, acid burns and chemical explosions. Accidents from all these causes are preventable, and yet they form the chief group with which safety workers have to deal.

The fourth panel stresses the importance of the provision and the use of goggles and helmets, protective agents which would doubtless prevent 70 or 80 per cent of all eye accidents. This panel concludes with the strikingly significant sentence: *"You can soon get used to goggles, but you can't get used to blindness"*—a mighty good slogan to tack up over the time clock permanently.

The fifth and last of the series is devoted to the dangers and results of improper conditions of illumination. As was brought forth by a writer in SAFETY ENGINEERING in a recent issue, Government statistics "attest the fact that 25 per cent of all the avoidable accidents are due directly or indirectly to defective illumination." Not only in the workshop, but also in the home, should this panel have its influence.

It is the hope of the committee that these reproductions may be widely used in individual sets or in quantity lots, under an arrangement described in the following quotation from a letter announcing the completion of the exhibit: "The cost of the original panels and of this first edition of reproductions totals about $800. If you care to assist in meeting this cost, 50 cents may be returned in the enclosed coin-card. Please understand that you are under no obligation to do so, but we do ask that you make the best use possible of the posters, getting them before the men while the new year is still young." Members of the National Safety Council will receive reprints of this exhibit, as a part of the regular bulletin service.

Electrotypes of the posters in various sizes, for printing on pay envelopes, safety post-cards, bi-monthly calendars, etc., will be supplied by the National Committee at cost. The posters may be mounted on muslin, and thus protected for permanent display. Because of the generous use of striking illustrations, the good lettering done in a size large enough to be easily legible from a distance of some feet, and the printing on a restful light-color background with facts and pictures closely related to the daily experience and conditions of the workers, the display of the exhibit will not fail to have its expected good effect.

During recent months the statement has frequently been made to the writer of this article, that labor conditions today caused by the tremendous and unexpected demands made upon many of our industrial concerns because of the European war, are militating against the enforcement of safety regulations. Workers are too scarce to make advisable their dismissal or discipline because of refusal to use such protective devices as may be provided. If that is the case, must we not bend every effort to impress more vividly than ever before upon the mind of the workman, through publicity panels of this nature, in big type and circus style, the dangers he runs if he fails to abide by certain rules? Thus unconsciously he will come to the continuous use of safety devices when engaged in occupations which are hazardous to eyesight, in much the same way that he has learned to think of certain brands when he orders commodities at the grocery store, a method indirect, but eventually effective.

Every reader of SAFETY ENGINEERING is urged to send today for a set of these large-size reproductions. Various corporations have already in a number of instances ordered quantity lots for the use of their subsidiary companies. They may be obtained from The National Committee for the Prevention of Blindness, 130 East 22d street, New York City.

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Stresses in Grinding Wheels

By S. V. James

IT is well known that many serious accidents have been caused by the rupture of grinding wheels due to overspreading. The writer, in an endeavor to ascertain how the stresses in a revolving disc wheel are distributed, has investigated various formulae derived by authorities to express this distribution. In the thought that the results of the application of such formulae to wheels of commercial sizes may be of interest, the following has been prepared:

The object of applying the formulae is to determine: (A) The distribution of stresses along a radius of a wheel rotating at a constant number of revolutions per minute; (B) The variation of stresses with (1) variation of peripheral speed, diameter remaining constant, (2) with variation of diameter, revolutions per minute remaining constant, and (3) with variation of diameter, peripheral speed remaining constant. In all calculations the wheel was assumed to be a flat disc (i. e., a disc of uniform thickness) with a circular hole in the center and not subjected to any external forces such as side pressure, face pressure or restraining action of flanges. It was further assumed that the wheel was fitted properly so that there was no stress such as would be due to forcing it on the spindle. Fig. 1 shows the wheel assumed.

For the sake of illustration it was decided to first calculate the stresses in a 12-inch wheel having a 1-inch hole and composed of material with a specific weight of 0.1 lb. per cubic inch. It was further assumed that the wheel was rotating at a speed of 2,864 revolutions per minute which corresponds to a peripheral speed of 9,000 feet per minute. This was chosen because it is the practice of many makers of abrasive wheels to test them at this speed before shipment, hence wheels which are afterwards put into service may have already been stressed to the amount involved at this speed.

Formulae evolved by two different investigators were used. The first to be considered, derived by Merriman in his "Mechanics of Materials," page 422, express the radial and tangential stresses as follows:

$$R_1 = \frac{3w\,W^2}{8g}\left(r_1^2 + r_2^2 - \frac{r_1^2\, r_2^2}{x^2} - x^2 \right)$$

$$S_1 = \frac{3w\,W^2}{8g}\left(r_1^2 + r_2^2 + \frac{r_1^2\, r_2^2}{x_2} - \frac{x^2}{3} \right)$$

where R_1 = radial stress per unit of area,
S_1 = tangential stress per unit of area.
w = weight per unit of volume of the wheel material.
W = angular velocity in radians per second,
g = acceleration of gravity,
r_1 = radius of the hole,
r_2 = radius of the periphery.

These formulae give, respectively, the radial and tangential stresses at any point in the wheel at a radius x. Arrows are shown on the wheel in Fig. 1 to indicate the directions of the two stresses considered. These formulae are based on certain well-known mathematical deductions, involving the centrifugal forces, but do not take into account the fact that when a material is stressed in one direction, it is subjected to an induced stress at right angles to the first. The ratio of the longitudinal to the lateral deformation of the material is called Poisson's ratio and is taken into account in the other formulae investigated later in this article. They give, therefore, what are known in mechanics as apparent stresses. True stresses result from an allowance being made for lateral contraction and will be calculated.

In the case of the wheel above mentioned, $w = 0.1$; $W = \frac{2\pi N}{60}$, where N is revolutions per minute and hence is 2,864, thus making $W = 300$; $g = 386$ inches per second^2 (the acceleration of gravity expressed in inches), $r_1 = 0.5$ inch; $r_2 = 6$ inches. Substituting in the formulae and reducing:

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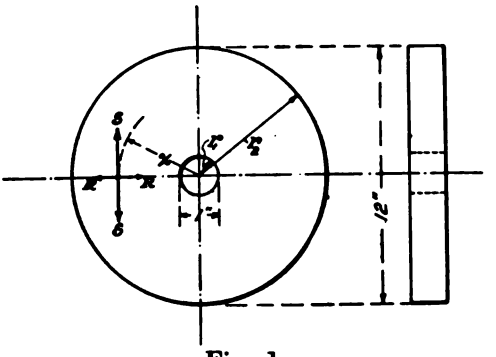

Fig. 1

$$R_1 = 316.77 - \frac{78.649}{x^2} - 8.738\ x^2$$

$$S_1 = 316.77 + \frac{78.649}{x^2} - 2.913\ x^2$$

Various values of x were then substituted in these equations and values of the stresses determined. Curves R_1 and S_1, Fig. 2 were then plotted showing the values obtained. Numerical values are given in columns R_1 and S_1, Table I.

Before discussing these the true stresses will be calculated using Stodola's equations derived especially for use in designing steam turbine discs and given in his book "Steam Turbines."

These equations for the stresses in a wheel of uniform thickness are:

$$R_2 = \frac{E}{1-u^2}\left[(3+u)\,ax^2 + (1+u)\,b_1 + \frac{(u-1)}{x^2}\,b_2\right]$$

$$S_2 = \frac{E}{1-u^2}\left[(1+3u)\,ax^2 + (1+u)\,b_1 + \frac{(1-u)}{x^2}\,b_2\right]$$

where R_2 and S_2 are the radial and tangential stresses,

E= modulus of elasticity of the material,

u = the reciprocal of Poisson's ratio,

$$a = \frac{-\,0.00002842\ N^2 w\ (1-u^2)}{8E}$$

in which N= revolutions per minute, and w= weight per unit of volume.

The constants b_1 and b_2 are dependent upon the conditions of the problem and it will now be shown how they are determined.

Since the inner periphery, the hole, is

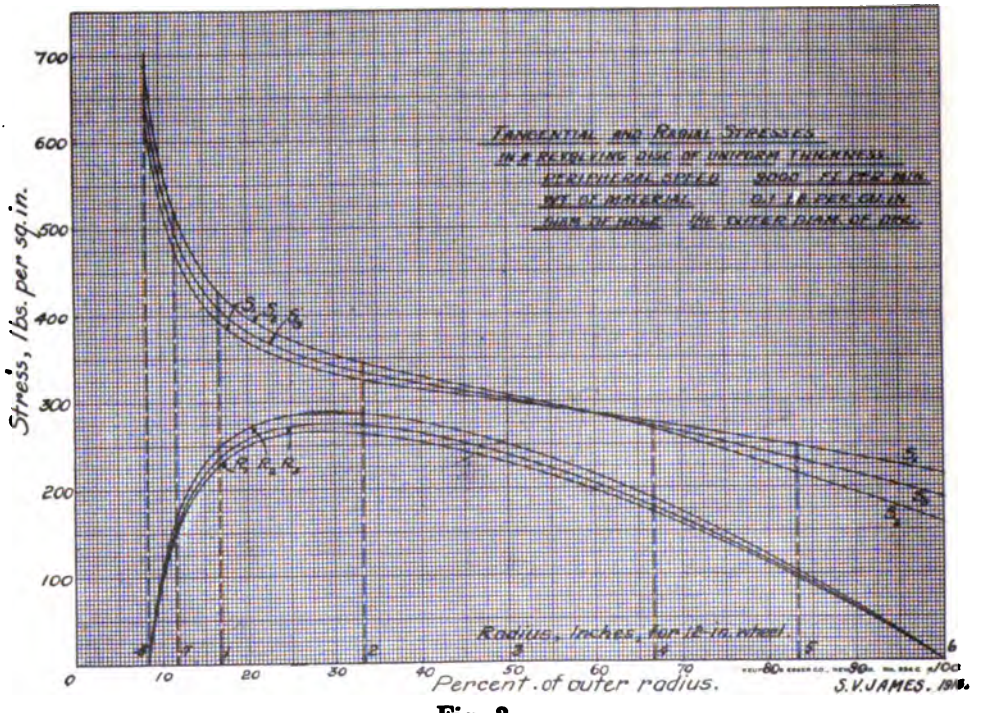

Fig. 2.

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of the proper diameter, the radial stress at this surface will be zero. It is also true that the radial stress at the outer periphery will also be zero. Then b_1 and b_2 are to be found by substituting the proper values in equation (3) letting x equal 0.5, the radius of the hole. This gives an equation in b_1 and b_2 and the whole expression is equated to zero since the radial stress at that point is zero. Another similar equation is obtained when the value of x is taken as 6, since the radial stress is zero at that radius also. Solving these two equations simultaneously gives values of b_1 and b_2 which may then be substituted in (5) and (6) and the final expressions for R_2 and S_2 evolved.

Assuming a modulus of elasticity of 2.500,000, u = 0.27 (Poisson's ratio 3.7),
w= 0.1 as before, N= 2,864 as before, the final equations are:

$$R_2 = -9.5285\,x^2 + 345.6 - \frac{85.82}{x^2}$$

$$S_2 = -5.275\,x^2 + 345.6 + \frac{85.82}{x^2}$$

Various values of x were then substituted and the resulting values of the stresses are shown by Curves R_2 and S_2, Fig. 2. Numerical values are given in columns R_2 and S_2, Table I.

Objection may be made that the assumptions for the values of the Modulus of Elasticity, E, and Poisson's ratio, u may not be accurate and, therefore, the whole value of the work rendered questionable. In order to show the effects of these assumptions, calculations with various values of E were made and it was found that in this particular problem E has no effect whatever on the resulting stresses as calculated. This may be seen by examination of the formulae since E is outside the entire bracket in each case and is only involved in the first term inside the bracket. Values of b_1 and b_2 will depend on the value chosen for E, hence the entire expressions reduced to the same equations respectively, irrespective of E. The value of u was taken at 0.125, (a Poisson's ratio of 8), which is probably well beyond the real value. The value of E was taken as 2,500,000, the same as before. The resulting curves are marked R_2 and S_2 respectively. Table I gives the numerical values in Columns R_2 and S_2.

TABLE I.
Stresses, Lbs. Per Sq. In.

Radius.		Merriman.		Stodola.			
x in	% of r_2	R_1	S_1	R_2	S_2	R_2	S_2
0.5	8.33	0	630.0	0	687.3	0	656.4
0.7	11.66	152.0	475.8	165.9	518.0	158.2	494.9
1	16.66	229.4	392.5	250.3	426.1	238.8	407.7
2	33.33	262.3	324.8	286.0	346.0	272.9	334.2
3	50	229.3	299.3	250.3	307.6	238.8	302.8
4	66.66	171.9	275.0	187.8	266.5	179.0	270.7
5	83.33	95.1	247.1	104.0	217.2	98.9	232.8
6	100	0	214.0	0	158.1	0	187.8

The above-mentioned curves give values between those of the first curves plotted from Merriman's formulæ and the second curves, using Stodola's formulæ, but having a higher value of u (or a correspondingly lower value for Poisson's ratio). Merriman's formulæ omit the consideration of u and give "apparent stresses" only, which is in reality equivalent to assuming the value of u to be zero, which implies a Poisson's ratio of infinity. Hence the values as plotted are consistent, progressing from one curve to another systematically as values of u change from zero to infinity. Substituting O for u in Stodola's formulæ (5) and (6) reduces the resulting values to figures identical with Merriman's formulæ (1) and (2), curves R_1 and S_1.

Examination of the curves shows that the tangential stress is a maximum at the hole and a minimum at the periphery, while the radial stress reaches a maximum at a point about 29 per cent of the outer radius from the center. In the case of a 12-inch wheel this is at a radius of about 1¾ inches. From the above it would appear that if any weakness of the material should occur near the center of the disc failure would probably take place at the hole and the wheel would burst on account of excessive tangential stress. Compared with tangential stresses, radial stresses are unimportant, since both stresses are tensional and no considerable variation of tensile strength of the finished wheel is liable to occur in different directions at any point.

Having determined the stresses in a particular wheel at a particular speed, it is of interest to see how these stresses

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vary with the speed of the wheel, the diameter being constant. An examination of the formulæ R_2 and S_2 indicates that for any value of x, the stress is proportional to "a" which involves "N^2." *Hence the stress is proportional to the square of the speed in revolutions per minute.* This is the same as saying that *the stress is proportional to the square of the peripheral speed,* since the latter is proportional to the number of revolutions for any given wheel. Knowing the stress from the curves at any point at 9,000 feet per minute, it is a simple matter to calculate the corresponding stress at any other speed as follows: Let s be the stress at a peripheral speed of v and S be the stress at V, then $\frac{s}{S} = \frac{v^2}{V^2}$ or $S = \frac{sV^2}{v^2}$. By means of this relation the stress at any given speed or the speed corresponding to any given stress may be calculated. As an example of the latter, let it be desired to calculate the maximum peripheral speed which a wheel of any given strength of material will withstand. Solve the above relation for V, the desired speed. We have $V^2 = \frac{v^2 S}{s}$. Let the strength of material be taken as 1,500 lbs. per sq. in., which corresponds to the breaking stress of the material ordinarily used in some types of vitrified wheels.

$$\text{Then } V = \sqrt{\frac{9000^2 \times 1500}{687.5}}$$

$$= 13{,}300 \text{ ft. per min.}$$

It is of interest regarding the above to note that as wheels are ordinarily recommended by manufacturers to be run at speeds not exceeding 6,500 ft. per min., the factor of safety may be determined by the above relationship. The factor of safety will be $\frac{13{,}300^2}{6{,}500^2} = 4.2$

Another point to be emphasized is the variation of stress with variation of diameter, speed in revolutions remaining constant. It has been shown above that the stress at any point varies directly as the square of the peripheral velocity or stress varies as V^2. Hence, since V varies as $D \times N$, V^2 varies as $D^2 \times N^2$ and, therefore, the stress varies as $D^2 N^2$. From this it may be seen that with N constant, i. e., with the number of revolutions per minute constant, stress varies as D^2, or, in other words, *with revolutions per minute constant, the stress varies directly as the square of the diameter.* This means that at 1000 revolutions per minute a 12-inch wheel will be subjected to 4 times the stress in a 6-inch wheel.

An especially interesting deduction may be made regarding the stresses in wheels of different diameters at the same peripheral speed. An examination of either formula (5) or (6) shows that the only factor involving the speed is "a." Now "a" varies directly as N^2 and it has been stated above that V varies as D N. Since in this case V is constant D N is constant, hence N varies as $\frac{1}{D}$, or, N^2 varies as $\frac{1}{D^2}$. Therefore, "a" varies as $\frac{1}{D^2}$. Further, since the coefficient of b_1 contains no value of x, b_1 is a constant for different sizes of wheel. Again, since the coefficient b_2 contains x^2 in the denominator, and the first term inside the bracket has x^2 in the numerator, b_2 varies directly as the square of the diameter. Check calculations were made to determine the stresses in wheels of the following diameter: 6 inch, 12 inch, 18 inch and 24 inch, and it was found that at any point at the same per cent of the outer radius for the various sizes, the stress was the same when V was taken as constant. Hence, the results were plotted in Fig. 2, using per cent of outer radius as abscissae.

From the above it will be seen that given a disc of uniform thickness, the only features determining the stresses at any point are the weight per cubic inch of the material and the peripheral speed. The curves given in Fig. 2 are, therefore, applicable to any disc of uniform thickness, having a hole 1/12 of the outer diameter, made of material weighing 0.1 lb. per cu. in. and running at 9000 ft. per min. peripheral speed. Stresses at

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cther speeds may be calculated as outlined above.

The conclusions drawn in this article may be summarized briefly as follows: The stress at any point in a uniform thickness disc varies directly as the square of the peripheral speed. The stress at any point at a given per cent of the outer radius from the center is the same in any two wheels of different diameter if both are run at the same peripheral speed. Since the stress varies as the square of the peripheral speed, it also varies as the product of the squares of the diameter and the revolutions per minute or stress varies as $D^2 N^2$, so that with D constant it varies directly as N^2 and with N constant directly as D^2.

Logging Accidents in Wisconsin

A Report by the Industrial Commission of Wisconsin for the Year Ending June 30, 1916

A LITTLE over a year ago the Industrial Commission of Wisconsin, with the co-operation of the loggers of the State, made a special effort to assist in reducing accidents in the lumbering industry. The commission now has an opportunity to survey results, and it is somewhat disappointed.

For the year 1916 the number of accidents exceeded those for the year 1915, and the cost to the employers was something like $6,000 more than for the previous year.

During 1916 there were 927 accidents, 31 of which were fatal. As a result of the accidents the injured employes lost nearly 30,000 days' time. The accidents cost the employers, either directly or through the insurance companies, $101,872. There were 3 accidents on engines, which cost nearly $2,000. Fifty-four accidents occurred in hoisting logs on loads or into rivers. These accidents cost in excess of $6,000. Forty-two accidents, two of which were fatal, occurred on logging trains. These accidents cost $9,594. Fifty-six accidents occurred on wagons and sleighs used in hauling logs. These cost $5,714. Eighty-six accidents occurred during the skidding of logs and cost over $8,000. Six accidents, 4 of which were fatal, occurred during the rafting of logs down streams. These cost nearly $10,000. One hundred and forty-six accidents, 17 of which were fatal, occurred by falling trees. These cost $20,712. The days lost as a result of these accidents, not counting the fatal ones, amounted to nearly 6,000. Thirty-one accidents, costing $5,661, were caused by flying objects, such as limbs flying back, hitting choppers, etc. Seventy accidents occurred by the employes slipping, stumbling, or otherwise falling. These cost in excess of $4,000. Two hundred and nine accidents occurred by the use of hand tools in workmen's hands, which cost in excess of $7,000. One hundred sixty-two accidents occurred as a result of lifting or rolling logs, piling and decking them, and in loading or unloading. These cost $16,012. Five of these accidents were fatal. Sixty-two accidents were the result of being kicked by horses or falling from horses, and stepping on sharp objects. These cost in excess of $6,000. Two of them were fatal.

The commission is wondering what it can do to help make a better record in the logging industry in Wisconsin in 1917. The commission feels sure that every logger will appreciate the necessity of something being done. A detailed statement of the accidents in 1916 is given on the three pages following:

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LOGGING ACCIDENTS IN WISCONSIN, JULY 1, 1915—JUNE 30, 1916.

INDUSTRIAL COMMISSION OF WISCONSIN.

Line.	Causes.	All Injuries.	Benefits. All Benefits.	Benefits. Indemnity.	Benefits. Medical Aid.	Permanent Injuries to: Fatal	Eye.	Arm.	Fingers.	Leg.	Foot.	Toes.	Other.	Temporary Injuries. All Temporary Injuries.	Days Lost.	Fractures. Leg.	Fractures. Arm.	Fractures. Rib.	Fractures. Other.	Sprains and Dislocations.	Cuts and Bruises.	Infections.	Other Temporary.
		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.
	All causes	927	$101,872	$74,085	$27,787	31	8	7	10	5	2	4	1	859	29,904	74	19	36	46	97	539	39	9
1	Engines	3	1,931	1,680	251	..	..	1	..	..	..	..	..	2	103	..	..	..	..	..	2	..	..
2	Log hoists—																						
3	Hoist falling	1	2,400	2,400	...	1	..	..	..	..	..	..	..	..	...	..	..	..	..	..	..	..	..
4	Boom swinging	1	18	8	10	..	..	..	..	..	..	..	..	1	10	..	..	..	..	..	1	..	..
5	Hoisting cable—caught in	3	310	86	224	..	..	..	1	..	..	..	..	2	75	..	..	..	1	..	1	..	..
6	Hoisting machinery—caught in	2	403	394	9	1	..	..	..	..	..	..	..	1	18	..	..	..	..	..	1	..	..
7	Hook or sling—hitching	7	163	101	62	..	..	..	..	..	..	..	..	7	134	..	..	..	..	..	7	..	..
8	Hook or chain—swinging	3	77	45	32	..	..	..	..	..	..	..	..	3	58	..	..	..	1	..	2	..	..
9	Hook or chain—breaking or catching	6	950	519	431	..	..	..	..	..	..	..	..	6	451	2	..	..	..	..	4	..	..
10	Hook or chain—tackle pulling out	6	152	81	71	..	..	..	..	..	..	..	..	6	91	..	..	..	..	..	6	..	..
11	Load lowering—struck by	1	136	88	48	..	..	..	..	..	..	..	..	1	79	1	..	..	..	..	..	..	..
12	Load swinging—struck by	10	1,260	868	392	..	..	..	..	..	..	..	..	10	783	2	..	..	1	1	6	..	..
13	Load and other object—caught between	4	169	134	35	..	..	..	..	..	..	..	..	4	126	..	..	..	..	..	4	..	..
14	Load falling—broken cable	1	77	38	39	..	..	..	..	..	..	..	..	1	31	1	..	..	..	..	..	..	..
15	Load falling—hitch slipping	6	127	67	60	..	..	..	..	..	..	..	..	6	92	..	..	..	..	2	4	..	..
16	Load falling—N. O. C.	2	59	45	14	..	..	..	..	..	..	..	..	2	56	..	..	..	..	..	2	..	..
17	Falls from boom	1	10	8	2	..	..	..	..	..	..	..	..	1	12	..	..	..	..	..	1	..	..
18	Log trains—																						
19	Falls from—collisions and derailments	5	528	433	95	..	..	..	..	..	..	..	..	5	540	..	..	..	..	1	3	..	1
20	Falls from—braking	2	34	18	16	..	..	..	..	..	..	..	..	2	28	..	..	..	..	1	1	..	..
21	Coupling or uncoupling	7	3,207	3,119	88	1	..	..	2	..	..	..	..	4	78	..	..	..	1	1	2	..	..
22	Getting on or off	5	2,035	1,798	237	..	1	..	..	..	..	..	..	4	69	..	..	..	..	1	3	..	..
23	Falls from—loading or unloading	15	3,212	2,934	278	1	..	..	..	..	..	..	..	14	551	2	..	3	1	3	5	..	..
24	Struck by—while loading or unloading	2	63	39	24	..	..	..	..	..	..	..	..	2	41	..	..	..	1	..	1	..	..
25	Trains—N. O. C.	6	515	284	231	..	..	..	..	..	..	1	..	5	172	1	1	..	..	1	2	..	..
26	Wagons and sleighs—																						
27	Tipping over	5	229	170	59	..	..	..	..	..	..	..	..	5	174	1	..	1	..	2	1	..	..
28	Falls from—loading or unloading	3	274	143	131	..	..	..	..	..	..	..	..	3	125	1	..	..	..	2	..	..	..

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29	Falls from or caught in load while riding..	19	1,401	827	574	..	..	..	..	1	..	..	..	18	648	1	..	2	1	4	10	..	..
30	Wagons and sleighs—N. O. C.....	29	3,810	2,639	1,171	..	..	..	..	2	..	..	..	27	1,177	3	2	3	2	1	16	..	..
31	Skidding—																						
32	Caught between dragged log and other object	19	2,283	1,330	953	..	..	..	..	..	..	..	..	19	1,333	4	..	..	..	1	14	..	..
33	Struck by log rolling.....	22	1,248	573	675	..	..	..	..	..	..	..	..	22	654	2	..	2	2	4	12	..	..
34	Struck by free end swinging.....	13	1,479	843	636	..	..	..	..	..	..	..	..	13	797	5	..	1	..	1	6	..	..
35	Log striking object and swinging.....	3	490	432	58	..	..	..	..	..	..	..	..	3	416	1	..	..	..	..	2	..	..
36	Hook or sling breaking or pulling out.....	9	391	201	190	..	..	..	..	..	..	..	..	9	218	1	1	..	..	..	7	..	..
37	Caught in tackle—hitching.....	3	91	63	28	..	..	..	1	..	..	..	..	2	48	..	..	..	..	..	2	..	..
38	Struck by drag rope or chain.....	3	891	727	164	..	..	1	..	1	..	..	..	1	34	..	1	..	..	..	..	..	..
39	Skidding—N. O. C.....	14	1,514	832	682	1	..	1	..	..	..	..	..	12	600	1	..	1	1	2	7	..	..
40	Rafting and river driving—																						
41	Falls from rafts, logs and boats.....	4	7,078	7,073	5	3	..	..	..	..	..	..	..	1	8	..	..	..	..	..	1	..	..
42	Caught between logs.....	2	2,888	2,850	38	1	..	..	..	..	..	..	..	1	96	1	..	..	..	..	..	..	..
43	Falling trees and limbs—																						
44	Limbs falling	26	1,761	900	861	1	..	..	..	..	..	..	..	25	808	..	..	..	2	..	22	1	..
45	Trees—in felling	52	8,542	6,762	1,780	8	..	..	..	..	..	1	1	42	1,374	3	1	2	5	3	28	..	..
46	Trees—kicking back	17	1,449	604	845	1	..	..	..	..	..	..	..	16	690	2	..	1	1	1	11	..	..
47	Trees—lodged in felling.....	21	3,962	2,657	1,305	1	..	1	..	..	..	..	..	19	1,640	8	..	..	1	..	9	1	..
48	Trees or limbs—struck by felled tree.....	13	2,896	2,155	741	5	..	..	..	..	..	..	..	8	256	..	1	1	1	..	5	..	..
49	Spring-poles—fly backs	11	1,056	538	518	..	..	..	..	..	..	..	..	11	547	1	2	2	..	..	5	1	..
50	Falling trees—N. O. C.....	6	1,046	616	430	1	..	..	..	..	..	..	..	5	479	1	..	..	1	1	2	..	..
51	Flying particles—chips, etc.....	12	2,378	1,793	585	..	3	..	..	..	..	..	..	9	181	..	..	..	..	..	9	..	..
52	Falling and flying objects—N. O. C.....	19	3,283	2,388	895	..	3	..	..	..	..	..	..	16	550	1	2	..	3	1	6	3	..
53	Falls of persons—																						
54	Slipping	37	1,179	835	344	..	..	..	..	..	..	..	..	37	861	..	1	5	1	15	13	2	..
55	Stumbling	20	2,341	1,653	688	..	..	1	..	..	..	..	..	19	451	..	3	3	..	7	4	2	..
56.	Falls of persons—N. O. C.....	13	738	479	259	..	..	..	..	..	..	..	..	13	466	2	..	2	..	4	5	..	..
57	Hand tools—																						
58	Axes—glancing	108	4,138	1,943	2,195	..	..	..	2	..	..	..	..	106	2,100	2	..	..	2	..	95	7	..
59	Axes—caught by limb, etc.....	21	636	345	291	..	..	..	..	..	..	1	..	20	401	..	..	..	..	..	19	1	..
60	Axes—cutting through	5	89	49	40	..	..	..	..	..	..	..	..	5	83	..	..	..	..	..	5	..	..
61	Axes—stumbling or slipping in carrying...	7	194	106	88	..	..	..	..	..	..	..	..	7	137	..	..	..	..	..	7	..	..
62	Axes—N. O. C.....	26	802	410	392	..	..	..	..	1	..	..	..	25	477	..	..	..	..	1	21	3	..
63	Canthooks slipping—struck by	3	137	48	89	..	..	..	..	..	..	..	..	3	62	..	..	..	..	..	3	..	..
64	Canthooks slipping—person falling	8	314	237	77	..	..	..	..	..	..	..	..	8	210	1	..	..	2	2	3	..	..
65	Canthooks slipping—load dropping	2	206	122	84	..	..	..	..	..	..	..	..	2	99	1	..	..	..	..	..	1	..
66	Canthooks—N. O. C.....	11	330	189	141	..	..	..	1	..	..	..	..	10	204	..	..	1	..	2	6	1	..
67	Cross-cut saws	9	149	72	77	..	..	..	..	..	..	..	..	9	130	..	..	..	..	..	9	..	..
68	Other hand tools.....	9	197	81	116	..	..	..	..	..	..	..	..	9	135	..	..	1	..	..	7	1	..
69	Handling of logs—																						
70	Lifting or rolling:																						
71	Dropping	7	205	119	86	..	..	..	..	..	..	1	..	6	96	..	..	..	..	..	6	..	..
72	Caught by logs.....	5	201	78	123	..	..	..	..	..	..	..	..	5	152	..	..	..	1	..	4	..	..

Line.	Causes.	All Injuries.	Benefits. All Benefits.	Benefits. Indemnity.	Benefits. Medical Aid.	Permanent Injuries to: Fatal	Eye.	Arm.	Fingers.	Leg.	Foot.	Toes.	Other.	All Temporary Injuries.	Days Lost.	Temporary Injuries. Fractures. Leg.	Arm.	Rib.	Other.	Sprains and Dislocations.	Cuts and Bruises.	Infections.	Other Temporary.
		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.
73	Caught between log and other object	9	327	235	92	..	..	..	2	..	..	..	..	7	133	..	..	..	..	..	7	..	..
74	Heavy lifting	14	338	180	158	..	..	..	..	..	..	..	..	14	220	..	..	..	..	14	..	..	..
75	Handling—N. O. C.	2	158	51	107	..	..	..	..	..	..	..	..	2	57	1	..	..	..	..	1	..	..
76	Piling or decking:																						
77	Caught between logs on rollway	26	1,502	965	537	..	..	..	..	..	..	..	..	26	929	3	3	..	2	4	13	1	..
78	Rollways breaking	11	1,928	1,424	504	3	..	..	..	..	..	..	..	8	451	2	..	1	1	..	4	..	..
79	Skids breaking or falling	2	15	6	9	..	..	..	..	..	..	..	..	2	17	..	..	..	..	..	2	..	..
80	Log rolling from rollway	7	2,232	1,788	444	1	..	1	..	..	..	..	..	5	278	3	..	..	..	..	2	..	..
81	Rollways—falls from	13	3,363	2,876	487	*1	..	..	..	..	..	..	..	12	324	1	..	2	..	2	7	..	..
82	Piling or decking—N. O. C.	3	53	38	15	..	..	..	..	..	..	..	..	3	53	..	..	..	1	1	1	..	..
83	Loading or unloading:																						
84	Caught between log and vehicle	8	245	130	115	..	..	..	1	..	..	..	..	7	127	..	..	..	1	..	6	..	..
85	Caught between two logs	3	67	55	12	..	..	..	..	..	..	..	..	3	77	..	..	..	..	..	3	..	..
86	Struck by log—skid breaking	2	85	41	44	..	..	..	..	..	..	..	..	2	44	..	..	..	..	..	2	..	..
87	Log on load falling	35	4,020	3,001	1,019	..	..	..	..	1	..	..	..	34	1,920	6	..	1	7	4	16	..	..
88	Log on load shifting	7	815	489	326	..	..	..	..	..	..	..	..	7	453	2	..	..	..	1	4	..	..
89	Loading or unloading—N. O. C.	8	458	234	224	..	..	..	..	..	..	..	..	8	243	1	..	..	..	2	4	..	1
90	Animals—draft—																						
91	Bites and kicks	22	3,825	2,443	1,382	..	2	..	..	..	1	..	..	19	892	2	..	..	2	3	12	..	..
92	Falls from	3	243	158	85	..	..	..	..	..	..	..	..	3	146	1	..	1	..	1	..	..	..
93	Sharp objects—																						
94	Stepping on	3	543	187	356	..	..	..	..	..	..	..	..	3	210	..	..	..	..	..	3	..	..
95	Striking against	8	340	139	201	..	..	..	..	..	..	..	..	8	164	..	..	..	..	..	6	2	..
96	Handling	14	527	243	284	..	..	..	..	..	..	..	..	14	270	..	..	..	..	..	5	9	..
97	Cold—exposure to	6	217	149	68	..	..	..	..	..	..	..	..	6	156	..	..	..	..	..	..	..	6
98	Causes—N. O. C.	6	439	184	255	..	..	..	..	..	..	..	..	6	225	..	1	..	..	..	1	3	1

*Permanent total disability.

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The Evidence as to Alcohol

By Nathaniel C. Harte

A LITTLE over a year ago the In- other publications, and a considerable body of writers, have lately taken to whacking the "Demon Rum" over the head with great vigor. There are fashions in all things, it is said, and one must not quarrel too much with those who, failing of other topics, fall back upon the bogy which was familiar to the Egyptians of the period of Moses, if the styles in writing for certain sorts of periodicals, so decree. But some protest may be permitted when statements put forward in the name of science and under the weight and dignity of a professional title are found to be so far from the facts as to lead to dire confusion of thought upon a question which needs for its solution the clearest of intellectual processes and the most assiduous searchings for the truth.

An article entitled "Alcohol vs. Safety," by Dr. J. P. Hourigan, appearing in the December, 1916, number of SAFETY ENGINEERING, is an example of this dangerously misleading kind of literature. Let us examine a few of Dr. Hourigan's statements:

"Alcohol," he says, "is a narcotic poison and in all its forms belongs to that class. . . .

"This class of poisons includes opium, morphine, ether, chloroform, chloral, heroin, etc. *It is by far the most dangerous of the class.*

"While other poisons of this class are productive of distinctly evil functional effects, alcohol, being equally seductive, and *as a habit more obstinate and tyrannical* than other narcotics, is, at the same time producing organic changes and working destruction to the important vital organs, and so eventually ruining the intellect and moral nature as well as the physical body.

"Alcohol impairs every human faculty.

"The higher and more complex the human faculty, the more pronounced is the effect thereof."

And so on without qualification.

Now what are the reasonable deductions from the specifications which attend the good physician's terrific indictment? First, that alcohol is the most dangerous of all poisons because of its seductive qualities and that as a habit former it is more obstinate and tyrannical than even opium, heroin, or morphine; second, that its use in the most moderate quantities, if persisted in, will ruin the individual in body and mind and, it may be remarked, in soul also; third, that as its effect is most pronounced upon the higher and more complex faculties, the most gifted individuals must necessarily reflect most vividly its destructive powers and finally, as it destroys individuals, it must destroy races and peoples. The latter conclusion is inescapable. If alcohol is the thing Dr. Hourigan says it is, and does the things he says it does, then any people which had generally used it over a period of a few centuries must inevitably have perished from off the face of the earth.

What are the facts? Every civilized nation of today has had hundreds of years of alcoholic experience. No individual of the great Caucasian clan, whatever his personal habits, but has, a few generations back, a very long line of ancestors given to indulgence in alcoholics. There is no escaping this, for until almost the dawn of the eighteenth century there was no thought in the civilized world but that alcohol conduced to the comfort, happiness and health of humanity. Alcohol is indeed civilization's tool, luxury, necessity, or curse—call it what you will. But civilization has not perished and civilized peoples have not perished. The nations that have habitually used alcoholics are today in the forefront, mentally and spiritually. It is even probable that they have advanced physically despite the handicaps that the modern industrial regime places in their path.

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Dr. Hourigan's theory is, indeed, flatly contradicted and refuted by the experience of mankind. His indictment is quashed in the court of public record.

And as to his general, so also as to his particular conclusions. The great statesmen of the world, the great poets, the great generals, the great scientists, the great physicians, and, it may be added, the great preachers, have been almost without exception men who used alcoholics, for the most part in moderation, but still quite as a regular thing. It would be indeed difficult to persuade the thinking public that Shakespeare, Gladstone, the Great Frederick, Bismarck, Washington, Jefferson, to instance but a few, were injured in their higher faculties by alcohol. Indeed, if a form of reasoning and presumption common among radical prohibitionists were to be employed here, it would be easy to point out that the list of total abstainers is almost entirely barren of individuals of real greatness and to draw many wise conclusions therefrom.

But this is a layman's argument. Let us see what some eminent practitioners of Dr. Hourigan's own profession have to say. A short time ago the city of Baltimore was called upon to decide whether or not it would adopt prohibition. In the campaign preceding the election, many of the sort of statements made by Dr. Hourigan were put out by the "dry" generals. But when the opinion of four of the leading physicians of the city was sought, they united in a public statement, in part as follows:

"We, the undersigned, physicians and surgeons of the city of Baltimore, endorse the following statement made by Sir William Osler, former chief of the medical staff of John Hopkins Hospital, in his work entitled 'Principles and Practice of Medicine,' eighth edition, page 396: 'In moderation wine, beer and spirits, may be taken throughout a long life without impairing the general health.' "

The men who signed the statement were Drs. Wm. H. Welch, W. S. Halstead, Hugh H. Young, and Julius Friedenwald, whose reputations are certainly not confined to the city of Baltimore in which they practice. Indeed they rank only behind the distinguished practitioner whose opinion they quote.

There is an abundance of evidence of the same character. The International Physiological Congress, held in England in 1898, adopted the following declaration: "The physiological effects of alcohol, taken in diluted form in small doses, as indicated by the popular phrase, 'Moderate use of alcohol,' in spite of the continued study of past years, have not as yet been clearly and completely made out. Very much remains to be done, but, thus far, results of careful experience show that alcohol so taken, is oxidized within the body and so supplies energy like common articles of food, and that it is physiologically incorrect to designate it as a poison, that is, a substance which can do only harm and never good to the body. Briefly, none of the exact results hitherto gained can be appealed to as contradicting, from a purely physiological point of view, the conclusions which some persons have drawn from their barely common experience, that alcohol so used may be beneficial to their health."

Dr. Arthur R. Cushing in his textbook of "Pharmacology and Therapeutics" said: "When beers and porter do not derange the digestion, they are most nutritive of all the alcoholic preparations, owing to the large amounts of carbohydrates they contain. Alcohol taken in addition to the ordinary food is either itself transformed into tissue, or undergoes oxidization instead, of some substance which in turn is used to build up the body."

Dr. Allan McLane Hamilton ("Nervous Diseases"), said: "A substance like alcohol, which is not only a food but a useful medicinal agent, should not thus be lightly and unfairly designated 'poison,' although when immoderately used it is pernicious. Certain admittedly beneficial sustenants of everyday life might as well be called poisons, among them sugar, which in excess produces serious tissue changes and disease, and which 'in a concen-

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trated solution is a powerful cell poison.' Even water, which total abstinence poets have delighted to praise in flowing verse, may overburden the heart, the blood vessels and kidneys, producing an increase in blood tension, if taken habitually in immoderate quantities and may give rise to dilation of the stomach and do a great deal of other harm."

Dr. Walter Ernest Dixon, Professor Materia Medica, etc., Kings College University of London, writing in *The Nineteenth Century* for March, 1910, said: "The secretion of the thyroid gland is essential for the proper working of the body, and both a deficiency of the secretion and an excess are prejudicial to health; the active constituent of the thyroid gland is undoubtedly a poison in excess but not in normal amounts. Alcohol also is a poison in narcotic, but not in physiological dosage. Even so well recognized a food as sugar, which is a normal constituent of the body, when present in the blood in excess, causes disease such as fatty degeneration."

Dr. Ulrik Quensel, the world renowned Swedish physiologist, in the course of an elaborate treatise, said: "As I have developed in the previous chapter, a strictly moderate use of alcohol, is, according to my opinion, not to be condemned from the individual hygienic point of view, and a majority of physicians probably take the same stand. Completely to discard all use of alcoholic drinks, even the most moderate, solely on dietetic grounds, is not supported by the results which hitherto have been gained through investigations directly aiming to try out the action of alcohol upon digestive functions and secretions by means of available scientific methods."

Dr. Hourigan cites a number of diseases which he declares, or implies, result from alcohol, neglecting however, to show that many of them may be due to other forms of indulgence. While he does not precisely say so, one might readily infer that cirrhosis of the liver, fatty degeneration of the heart and other heart troubles, apoplexy, cerebral troubles and kidney disease, were almost invariably due to the use of alcohol. All physicians know that there are many other causes of such disorders. Again Dr. Hourigan says:

"Thirty per cent of the insanity in the world is the direct result of alcohol. Statistics from the world over are in peculiar accord in supporting the statement."

It is strange, indeed, that some of the most noted alienists of the country have not encountered these statistics, or if they have, do not recognize their significance. Dr. Frankwood E. Williams, who as executive secretary of the Massachusetts Society for Mental Hygiene and chairman of the Advisory Prison Board of Boston, ought to know something about this, read an essay before the American Public Health Association in session at Cincinnati on October 24, 1916, in which he said:

"Fifty years ago, before the causes of mental disease were really known, the superintendents of the insane hospitals in the country were united in the belief that alcohol was the chief cause of insanity, and the reports of those years devote pages to the discussion of the havoc wrought in mental life by alcohol. But, as so often happens, a more careful study of the problem has shown that the early reports are inaccurate due to a frequent getting of the cart before the horse. The excessive drinking of alcohol which leads to the deduction of what are known as the alcoholic psychoses, is frequently but a symptom of a previously existing and underlying nervous and mental condition. . . .

"If we assume that 20 per cent, and many enthusiasts have placed the figure at 80 per cent, of insanity is due to alcohol, and work upon that basis, we are going to find out that with alcohol abolished, should the time ever come, we shall be disappointed in the comparatively small diminution that will take place in the amount of mental disease in the community."

Dr. Chas. L. Dana, the noted neurologist, published a paper in the annals of the American Academy of Political and Social Science, July, 1909, in

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which he discusses this subject at length, pointing out that many races and communities not afflicted with alcoholism have nevertheless high percentages of insanity. In conclusion he says:

"In a majority of cases alcoholism is not a disease so much as it is a symptom of a neuropathic constitution. In fact the test of a neuropathic constitution is the inability to use alcohol at all or to use it wisely or moderately. Alcoholism is in reality only a symptom, the expression of an unstable constitution. It is really this unstable constitution which blossoms out in alcoholism, and which is perhaps led through this into an insanity. . . . The flowing bowl would do little harm if it were not for the shallow pate."

In the *Elm Tree Monthly* (July-August, 1916), Dr. Dana again discusses this subject in a letter, in the course of which he says:

"On the whole I am inclined to think it would make no appreciable difference in social conditions whether a nation was dry or moderately wet. There would be a change of type in social evils, but our poverty, crime, insanity, nervous and mental defectiveness, would be about the same. This was, at least, what the data obtainable showed. Thus in a dry State like Kansas, the percentage of alcoholic insanity is 1.7, that of dementia præcox, 37. In New York the percentage of alcoholic insanity is 7.4, that of dementia præcox 16.9, while the total percentage of insanity is about the same. It should be remembered that a great deal of alcoholism so called, is not alcoholism, but mental weakness and defect and disease, of which immoderate drinking is the expression. The capacity to drink ethyl alcohol without feeling a disagreeable reaction and to take it very moderately is in a sense a test of a sound constitution."

Dr. Hourigan drops some rather vague and unspecific hints to the effect that alcohol is, or may be, a chief cause of industrial accidents, of which it may be said that the only study of this subject on record was made by Gustavus Myers, who published the results in the *American Statistical Quarterly* for September, 1915. Mr. Myers found after an examination of the official statistics of the States which kept records, that at least 50 per cent of industrial accidents were due to the inherent risks of the trade; that such factors as fatigue, overspeeding of apparatus, inexperience or ignorance of workmen, also contributed, and "that deliberate recklessness or intoxication is not frequent as a cause of accident, and in fact, is so exceedingly slight as not to require serious consideration in the analysis of the immense number of accidents occurring in the United States annually."

That intemperance is a proximate cause of a very large proportion of the crime committed in America, is another assertion of Dr. Hourigan's, who proves it by the admissions of "fully three-fourths of the prisoners with whom I have personally conversed in different parts of the country." This can scarcely be regarded as conclusive evidence. There is very little collected evidence on the subject, but a thoughtful paper by Robert Blackwood (*The Forum,* for August, 1916) shows how flimsy is the foundation for such a view and how much reason there is to believe the contrary. Criminals, of course, drink, as do other men. Eighty per cent of the male population indulges to some extent. But of 9,088 persons convicted in New York in 1914, 8,351 were of temperate habit. The "dry" States had more convicts in proportion than "wet" States in the same sections of the country. Of course, liquor is often the convenient scapegoat held out to view by many criminals who desire to profit by sentimental interest.

As a clincher, Dr. Hourigan quotes from British Army posters and from the Kaiser and others, warnings against alcohol. Here he fails to recognize that few Europeans apply the terms "alcohol" and "alcoholic" to such beverages as light beer, light wine and cider, but use them to designate the heavy spirituous liquors. Thus the league against alcohol of France recommends wine, beer, and the like as substitutes for distilled liquors. The legislation against "alcohol" in Scandinavia and other countries favors beer and wine by subjecting them

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to light taxation and to few restraints in sale. And practically all of the warring nations serve alcoholic rations to the soldiers. Germany has a regular bureau which looks after the beer supply for the troops and requisitions a great part of the output of the breweries therefor. She actually issues a circular letting her men know how to distinguish good beer from bad. Austria-Hungary supplies wine and beer. France gives her gallant warriors regular portions of wine, and has lately increased this ration. Italy also serves wine to her soldiers, and Great Britain gives hers a regular allowance of rum which is commuted, when occasion permits, to beer. These nations realize that they are engaged in a veritable death struggle. They demand of and seek from their soldiers the highest forms of courage and efficiency. There is not the slightest doubt in the world that if the use of the light alcoholics were regarded by their scientists as detrimental to the fighting man, such beverages would be banished without ceremony from the armies. That they are supplied in regular quantities, at considerable expense, would seem to indicate that they are regarded as contributing something of value to the soldiers' ration.

All this is not a plea for the use of any alcoholic beverage whatsoever. It is a protest against the sweeping, indiscriminate and fallacious warfare upon alcohol in any form, in any amount and in any circumstance. The *misuse* of alcohol does indeed create grave evils, and set up complex problems, but we will get nowhere in the way of remedy and solution until we first fortify ourselves with knowledge, find the courage to face the facts, and reason therefrom and act thereupon.

* * *

The burden of this article has thus far been the negative of the doctor's case. Authorities have been marshaled in reply to the many statements offered "ipse dixit" that should prove convincing. They constitute a refutation on evidence. In conclusion, the workmen's insurance experience of the writer's plant, covering its accident record and the result of its safety work among its employes, who habitually use alcoholic beverages during and outside of working hours, may be of especial interest to the sincere student of the alcohol question in its relation to industry.

The writer of this commentary on Dr. Hourigan's article is an executive of one of the lager beer breweries in the State of New York, and has been, and is, enthusiastically interested in the safety movement.

At the outset it may be of interest to note that, following the custom of the industry, the employes of his plant are allowed 5-minute recesses at ten in the morning and at three in the afternoon. During these recesses, as well as at opening, at noon and at closing, the employes repair to the plant's beer dispensary, where as many glasses of beer are allowed them, gratis, as they desire. No restriction whatever is placed upon the drinking of the employes. *This privilege has never been abused and has never resulted in intoxication;* the employes are temperate users of beer.

A questionnaire, addressed by the writer to the two largest carriers of brewery workmen's compensation insurance in the State of New York, elicited the response that not one accident to brewery employes—the result of intoxication—had ever been reported to them. The health record of the writer's employes is excellent and will compare favorably with that of any other industry or trade. Furthermore the average length of continued service of the plant's employes is remarkable and again will safely challenge that of any other industry or trade.

To the earnest student of safety work, however, the accident record of the plant's employes, as reflected by its insurance experience, should be especially interesting. In view of Dr. Hourigan's indictment of the use of alcoholic beverages, the workmen's compensation rate carried by the writer's plant might rationally be expected to reflect a high percentage of accidents and be expected to carry consequent penalties. If the use of alcoholic beverages—beer, among them—impairs the mental and physical

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faculties of the industrial worker, surely the accident experience of a *brewery,* permitting the free use of its products by its employes, should be extraordinarily high according to Dr. Hourigan.

The basic insurance rate of breweries, under the rating schedules of the New York Workmen's Compensation Commission, is $2.43 per $100 of pay-roll, anticipated upon the inherent industrial risks of the brewing business. Under the present regulations of the rating board of this commission, all employers of labor are penalized or allowed deductions from this rate based upon their experience since the law became operative. The State rating board recently promulgated its revised rate for the writer's plant, based upon the evidences of its safety work and its accident experience. Its new schedule rate is $1.45 8/10, for the year 1916-1917, against its brewing operations, with an additional credit of 5.97 per cent on all other classifications! This, furthermore, is the *lowest rate obtainable* under the rules of the rating board!! And the writer's plant has sound reason, in conjunction with other breweries insured to expect, in addition, handsome dividends from the mutual carrying their insurance!!!

Even a biased plant executive will readily understand the significance of this record.

American Museum of Safety

ARTHUR WILLIAMS, president of the American Museum of Safety and one of the foremost believers in the conservation of life and limb in America, gave a luncheon at the Bankers' Club, New York, January 11, to introduce the new director of the American Museum of Safety, Arthur H. Young, to the trustees of the museum.

Mr. Williams has been the guiding spirit of the American Museum since its formation. His interest in preventing injury to mankind, and its attendant suffering, is profound. His efforts to make the American Museum of Safety more and more potent in this great work are unceasing. Although his time is taken up by the large enterprises with which he is associated, he can always find time to advance the principle to which the American Museum of Safety is dedicated.

Mr. Williams has a broad viewpoint as to the necessity for safeguarding human life. It is his ambition to make the American Museum of Safety a national force in the safety world.

The prominence of those present at this luncheon was an impressive demonstration of how the foremost men regard the work of conserving human life. There were gathered around this table men standing at the head of their several endeavors, such as industry, the legal and medical professions, learning, finance, insurance, safety, etc. All are moved by the same impulse, namely, to conserve human life.

Judge Gary, chairman of the board of directors of the United States Steel Corporation, made an address which was listened to with profound interest. Judge Gary's views on the importance of preventing accidents in industrial plants are well known throughout the country. It is an inspiration to hear what he has to say on the protection of the industrial workers, as he is the largest employer of labor in the world.

Judge Gary stated that "if a life is saved, it is well worth the effort and expense made." This statement alone should remove any doubt in any man's mind as to the value and necessity of accident prevention. He continued that "100 lives saved are 100 times more worth while, and 1,000 lives saved are 1,000 times more worth while."

At present the United States Steel Corporation employs 270,000 men. The efficiency of the safety departments in

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Judge Elbert H. Gary

L. R. Palmer

A. N. Young

Robert W. DeForest

James Speyer

Arthur Williams

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the various subsidiary companies of the United States Steel Corporation is equal to, and in some cases surpasses, that found in any other industrial establishment. The prevention of accidents among the hundreds of thousands of employes of the Steel Corporation is a live and necessary policy which must be observed. There is no firmer believer in this than Judge Gary himself, but Judge Gary, who has this vast problem of of 270,000 employes on his hands tells us that while the humanitarian's viewpoint should be sufficient to warrant every effort being made to safeguard industrial workers against injury there is a business side, dollars and cents, to this work. It pays and pays well. This was his message to every employer who wants to consider this matter from a financial standpoint. It would be difficult to secure a more complete endorsement from one who has authorized millions of dollars to be expended for preventing accidents.

Judge Gary paid a splendid tribute to A. H. Young, who was until recently the supervisor of safety and labor of the Illinois Steel Company, a subsidiary of the United States Steel Corporation. He stated that the American Museum of Safety had taken one of his best men. He had made it his business to look up Mr. Young's record, and knew the fine prospects Mr. Young surrendered when leaving the Illinois Steel Company; but had the matter been placed before him he could have found no logical objection to Mr. Young's leaving his employ to come to the American Museum of Safety. He believes that Mr. Young will prove a great success and will fulfill the requirements for making the American Museum of Safety a national factor in the safety world.

James Speyer, banker, treasurer of the Museum of Safety, is a staunch believer in the protection of industrial workers. He stated that, while not an industrial employer himself, he was aware of the splendid and profitable results which had been secured on industrial safety campaigns. Mr. Speyer believes that every industrial employer should put safety effort in his plant. He stated that he had long been much impressed with the splendid work which was being done in many of the large industrial plants in America and was glad of an opportunity to say this to Judge Gary.

Dr. Hoffman, of the Prudential Insurance Company, said that he looked forward to the time when the American Museum of Safety should be supported with the same generous spirit as is the American Museum of Natural History and the Metropolitan Museum of Art. To his mind, the American Museum of Safety has a greater mission than either of the two splendid institutions of knowledge and art. Dr. Hoffman also said that in seeking a new director for the American Museum of Safety, he went to those best fitted for recommendation and his wants were few and simple. "We want the best man we can get for the duties of a safety director of the American Museum of Safety." It is the opinion of many that Mr. Young can fulfill these requirements as well as any man.

Robert W. De Forest, president of the Metropolitan Museum, said that when the idea was conceived some 50 years ago for founding the Metropolitan Museum of Art those responsible for the project started out to raise $250,000. After working almost 2 years they had secured gifts of less than $150,000 from this great city of New York. Today the operating expenses of the Metropolitan Museum are over $450,000 a year and the assets, outside of objects in the museum, are more than $10,000,000.

A. H. Young stated that he had pledged his very best endeavor to realizing the ambition of the trustees. He was deeply impressed with the splendid spirit of co-operation which has been tendered him from the trustees, and on all sides, and looks forward to the future with full confidence.

Mr. Williams in his remarks paid tribute to the invaluable and untiring effort of Mr. Hopkins, who had assumed the duties of director for some little time before Mr. Young was appointed.

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National Safety Council's Universal Emblem

THE National Safety Council is taking steps to keep the use of its new universal safety emblem within the bounds of good taste and discretion. It is a cautionary or danger emblem; not a general safety symbol like the white cross on the green background.

An application for a "license patent" is now pending in the United States Patent Office, and the council will control the emblem; it cannot be used to advertise any commercial article, such as tea, beer, cigars, etc. The sign manufacturers will be expected to comply with the rules and sell the sign only for the purpose intended. The executive committee of the National Safety Council is anxious to have the symbol adopted universally, but at the same time its use will be restricted properly.

The following bulletin was issued recently by the council:

TENTATIVE REGULATIONS GOVERNING USE OF UNIVERSAL DANGER OR CAUTION EMBLEM

1. The danger emblem is to be used only to warn the public at definite places of conditions requiring more than ordinary caution against possible injury or loss of life. It may be displayed, however, for purposes of instruction, as follows:

(a) When used for instruction, the danger emblem shall not, except as elsewhere herein provided, exceed 3 inches square, and shall be so displayed that the public will readily understand that it is being displayed for instruction and not to indicate the presence of danger.

(b) Danger emblems of any size may be displayed on lecture platforms or through stereopticons or moving picture machines, provided such use does not in any way confuse or mislead the public, and that such use does not violate any of these regulations.

(c) In order not to confuse the public, the posting of the emblem for education should be confined to bulletin boards generally recognized by the public as such.

(d) The danger emblem may be used on inside pages of newspapers, magazines, books and other literature when for education and not for commercial purposes. The reason for such use should be clearly indicated.

2. Its various dimensions must always be in proportion to the master size, which is 12 inches square.

TABLE OF SOME ACCEPTABLE PROPORTIONS IN INCHES

Overall size of black square.	Longest diagonal of square (approximate).	Diameter of red ball.	Total width of white cross.	Width of black diagonal and border lines.
24	34	13	19	2½
18	25½	9¾	14¼	1⅞
12	17	6½	9½	1¼
10	14⅛	5 13/32	7⅞	1 1/16
8	11 5/16	4 10/32	6¼	⅞
6	8½	3¼	4¾	5/7
4	5⅝	2 5/32	3⅛	7/16
3	4¼	1⅝	2⅜	5/16
2	2 13/16	1 3/32	1 9/16	7/32
1	1 13/32	35/84	25/32	7/64

3. When displayed, the danger emblem must always have one of its diagonals in a horizontal position.

4. The danger emblem must always be kept free from defacement by word, sign or character of any nature.

5. The danger emblem should always be accompanied by words, signs, or characters indicating wherein the danger lies, or giving the specific reasons for its use; it should never be used alone.

6. When the need for caution which prompted the use of the danger emblem has ceased to exist, the emblem must be removed.

7. The word "safety" or its translations or synonyms shall not be used in conjunction with the danger emblem. Such words often carry a suggestion exactly opposite to that for which a danger emblem is intended.

8. The danger emblem may be used in advertisements of danger signs of which it forms a part, but must not be used for any other purpose of trade or as an advertisement, or in any decorative way, except in the solicitation of orders for danger signs, when emblems of any size may be used, if confined to catalogs or other literature and displayed only as a part of a complete sign in accordance with other regulations.

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Kingsland and Haskell Disasters

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A View of a Section of the Canadian Car and Foundry Company's Plant, Kingsland, N. J., After the Fire and Explosions

TWO more disastrous fires and explosions in munition plants call attention to the great peril to "non-combatants" in the United States, particularly to persons who dwell in the States of New Jersey and Pennsylvania.

The disasters in Kingsland, N. J., on January 11, and Haskell, N. J., on January 12, are believed to have destroyed property valued at between $15,000,000 and $18,000,000. The number of killed and injured has not been ascertained.

Records kept by SAFETY ENGINEERING show a distribution of 41 munition plant disasters as follows: New Jersey, 13; Pennsylvania, 11; New York, 3; Canada (Ontario and Quebec), 4; Illinois, 2; Massachusetts, 1; Ohio, 1; Connecticut, 1; Missouri, 1; Virginia, 1; Washington, 1; Wisconsin, 1; West Virginia, 1.

By these disasters 70 persons are reported to have been killed, and definite reports show 50 persons injured—a minimum figure as in various fires and explosions injuries of "several" or of "many" were mentioned.

Photographs of the burning of the Canadian Car & Foundry Company's plant at Kingsland show a great volume of smoke and the heavens streaked with fiery lines, marking the courses taken by exploding shells.

What happened at the DuPont Works in Haskell, that is what a photograph would show, is not ascertainable as armed guards surrounded the works after the explosion and no persons except employes and those having an official right to enter were permitted on the premises. The mills of the German Artistic Silk Weaving Company in Pompton, 2 miles away, were badly damaged. Every window was blown out, roofs were destroyed and machinery was converted into scrap.

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Types of Shells That Exploded by Thousands at Kingsland, N. J.

FIRES AND EXPLOSIONS IN MUNITION PROPERTIES IN 1916 AND THE EARLY PART OF 1917, REPORTED IN SAFETY ENGINEERING'S FIRE REPORTS:

1916.

POMPTON LAKES, N. J. Jan. DuPont Powder Co. Explosion in cap plant. One life lost	
MOUNT UNION, PA. Jan. 7. Aetna Explosives Co. Finishing mill. Spon. combustion	$60,000
GIBBSTOWN, N. J. Jan. 14. DuPont Powder Co. Explosion. Three persons injured	
HUNTINGTON, PA. Jan. 16. Aetna Explosives Co. Carelessness of inexperienced employes	15,000
GRAFTON, ILL. Jan. 19. Illinois Powder Co	10,000
HOPEWELL, VA. Jan. 21. DuPont Powder Co. Explosion of tank	100,000
CARNEY'S POINT, N. J. Jan. 28. DuPont Powder Co. Seven employes injured	100,000
POTTSVILLE, PA. Feb. 2. DuPont Powder Co. Mixer bldg. Others. Explosion	
EMPORIUM, PA. Feb. 7. Aetna Explosives Co. Picric acid plant. Dry house. Explosion	
TACOMA, WASH. Feb. 7. Powder works at DuPont. Explosion of dynamite	10,000
SCHENECTADY, N. Y. Feb. 14. General Electric Co. War munitions	5,000

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DuPont Works, at Haskell, N. J., Before the Explosion. No Photographs Taken for Publication After the Disaster

SIMSBURY, CONN. Feb. 24. Ensign-Bickford Co. Mfr. fuses, etc. Overheated electric heater.....

CARNEY'S POINT, N. J. Feb. 24. DuPont Powder Co. Dryer mill .....

ROCHESTER, N. Y. Feb. 24. Rochester Fireworks Co. Storehouse damaged .....

EMPORIUM, PA. Feb. 26. Aetna Explosives Co. Gun cotton finishing dept. 75,000

MAPLEWOOD, MO. Feb. 28. Cooney Construction Co. Powder house. Explosion 200,000

CARNEY'S POINT, N. J. Mar. 12. DuPont Powder Co. Mixing house of plant No. 3 damaged.....

OLYPHANT, PA. Mar. 29. DuPont Powder Co. Explosion of 1,500 lb. powder 20,000

BLUEFIELD, W. Va. April. DuPont Powder Co. Explosion. Three lives lost .....

RENFREW, ONT. May 5. O'Brien munitions plant. Dry house. Six persons injured 40,000

GIBBSTOWN, N. J. May 15. DuPont Powder Co. Explosion. Eleven lives lost. Several injured..... 250,000

WAYNE, N. J. June. DuPont Powder Co. Explosion. One life lost. Eight injured .....

WASHBURN, WIS. July 11. DuPont Powder Co. Acid plant. Def. electrical apparatus .....

POMPTON LAKES, N. J. July 13. DuPont Powder Co. Sixteen bldgs. Explosion of nitroglycerin .....

RENFREW, ONT. July 15. O'Brien munitions plant. Three bldgs. 100,000

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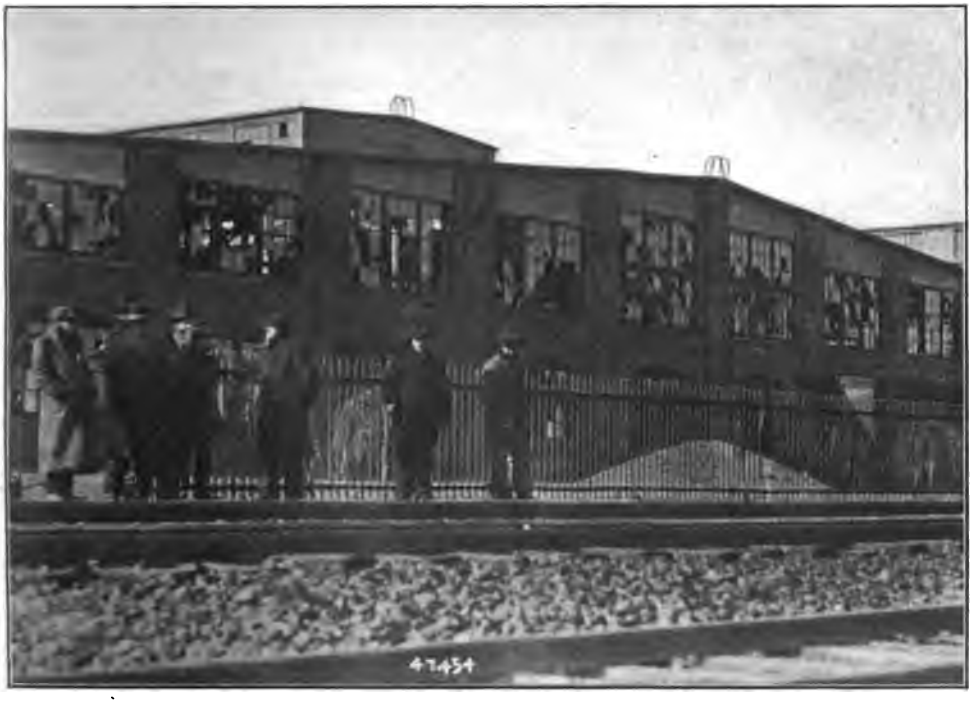
Wreck of German Artistic Silk Weaving Company's Plant at Pompton, N. J., Two Miles from Haskell



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D., L. & W. Railroad Shops at Kingsland, After Bombardment with 3-inch Shells

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BLACK TOM ISLAND, N. Y. July 30. Barges loaded with munitions. Explosion. Seven lives lost. Many injured.....	20,000,000
DRUMMONDVILLE, QUE. Aug. 20. Aetna Chemical Co. Powder factory. Five lives lost, 14 injured.....	20,000
ASSONET, MASS. Aug. 25. Daly Bleach & Dye Works. Mfg. gun cotton	50,000
ST. THOMAS, ONT. Sept. 5. St. Thomas Construction Co. War munitions. Started in furnace room.....	20,000
OLYPHANT, PA. Sept. 12. DuPont Powder Co. Press mill.....	
MOUNT UNION, PA. Sept. 20. Powder mill. Explosion. Eight lives lost	
GRAFTON, ILL. Oct. 5. Illinois Powder Co. Explosion dynamite. Three lives lost. Several injured.....	
NEW CASTLE, PA. Nov. 14. American High Explosives Co. Ammonium-nitrate dept. at Coverts Station destroyed.....	25,000
DAYTON, OHIO. Nov. 22. Manufacturers' Production Co. Munitions	150,000
PENNS GROVE, N. J. Nov. 30. DuPont Powder Co. Explosion of black powder. Thirty-one lives lost.....	8,000,000
EMPORIUM, PA. Dec. 8. Aetna Explosives Co. Dry house destroyed	
IRON BRIDGE, PA. Dec. 9. Penn Trojan Powder Co. Dryer bldgs.	10,000
GIBBSTOWN, N. J. Dec. 14. DuPont Powder Co. Hexite house destroyed	5,000
CARNEY'S POINT, N. J. Dec. 19. Dupont Powder Co. Started in wet dryer	

1917.

KINGSLAND, N. J. Jan. 11. Canadian Car & Foundry Co. Forty bldgs. Explosion. Several persons missing.....	17,000,000
HASKELL, N. J. Jan. 12. DuPont Powder Co. Explosion of 400,000 lb. powder. Two persons missing, 12 injured. Neighboring bldgs. damaged.....	1,500,000

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Training Pupils in the Spirit of "Safety First"

Work of the Massachusetts State-Aided Vocational Schools

By Chester L. Pepper

Agent, Massachusetts State Board of Education

SEVERAL years ago, while serving as a safety engineer and inspector in Massachusetts, I had occasion to recommend many changes in a large factory doing machine shop work. Improvements in the equipment were urgently needed from the standpoint of accident and fire prevention.

When I had completed my recommendations, the need of which was fully appreciated, the manufacturer asked me this question: "Why is it that factory inspectors insist that I take all the different safety precautions in my plant and yet they never make any effort to improve conditions in the schools where the workmen are trained? My son tells me that in the school shop where he is taught machine work there is not a dangerous gear or belt in the entire place that is guarded."

Years later when my work developed and I entered the field of educational administration, I kept in mind the statement of that mill manager.

A close inspection of the Massachusetts State-aided vocational schools showed that while most of the schools had taken great precautions in regard to the prevention of fire and accidents, a few were below a satisfactory standard in this respect. When the situation was pointed out to the school officials, and methods of improvement suggested, they made all necessary changes at once. The attitude of the schools toward the safety movement was excellent and continues to be. They are ready to adopt any method at any time that will help to safeguard all phases of the school work.

Our Massachusetts vocational schools have gone farther than perfecting the safety of the individual plant. They have made a decided step in advance by training all boys in the principles of safety work, not only in their own trade but in other trades with which they come in contact. To merely tell a boy about safety engineering and leave off at that point, would be poor pedagogy. A clear understanding of the subject must be fixed in the mind of the boy, by having him *do the safety inspection work himself, in the same way that any regular factory inspector would do this work.* His inspection report is placed before the director for action; if his criticisms and suggestions are reasonable, they are followed at once and all needed improvements are made.

Preparatory to installing this inspection system the following circular letter was sent out, addressed to all directors of State-aided vocational schools:

TRADE HYGIENE

With each succeeding year the laws of Massachusetts call for individual employers to pay closer attention to conditions of safety, fire and health. At the present time a skilled workman who is careless of his personal safety is too expensive a man to keep. It is well known that the demoralization throughout a mill which usually follows a serious accident, together with the loss of time and the expense involved under the workmen's compensation act, oblige all employers of labor to use all possible means to educate their employes along the lines of accident prevention. In a similar manner measures to prevent fire and disease are constantly being developed. In many mills it is customary to give substantial rewards for suggestions from the workmen in regard to ways of preventing accidents, fire or disease.

Obviously, if the schools are to train boys to meet the requirements of modern industry, the boys must be trained in the best methods of trade hygiene. The school, by safeguarding all its equipment according to the best known practice, from accident and fire, can train the boy subconsciously in the ways of safety and fire prevention.

The organization of fire drills and the school fire brigade offers a good subject for

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civic training and develops in the boys coolness and self-confidence under the stress of sudden excitement or panic.

Every boy can be taught to appreciate the principles underlying the prevention of accident, fire or disease, by making a shop inspection at certain intervals. After each boy has had several turns at making a shop inspection he will soon develop the habit of watching for all conditions violating the principles of trade hygiene.

By the aid of a good inspection blank, which the boy should be required to fill out and post after the inspection is completed, the methods of efficient inspection can soon be learned.

By training the boys in inspection methods we can develop in them keenness of observation to note possible improvements in shop conditions. This characteristic properly developed, along with efficient trade training, will be quickly appreciated by employers and more rapid advancement usually follows.

Sample inspection blanks follow.

GENERAL SHOP INSPECTION REPORT

Improvements urgently needed.
Is all exposed gearing guarded?
Is any guard loose or broken?
Location.
Are any guards now removed from machines?
Location of such machine.
Are the contact points of all belts and pulleys guarded?
Have any improvements been made in guarding belts and gears since last inspection?
Has any workman worn loose sleeves or jumpers?
Give names.
Have any belts become loose or torn?
Where?
Does any belt fastening offer a rough projection that would cut the hand?
Where?
Are all men who are engaged in chipping or grinding provided with safety goggles?
Give names of any students engaged in chipping or grinding who do not wear goggles.
Have all projecting set screws which revolve been removed?
Are all aisles and passages between machines free and unobstructed?
Has anyone been hurt since last inspection?
Give brief details.
Give names of any students who fail to have even the slightest cut properly sterilized and bandaged immediately.
Were any machines not cleaned up after using?
Give students' names and machines not cleaned.
Is all dirty cotton waste placed in sheet iron receptacles?
Are there enough receptacles?
Where needed?
Are all closets clean and free from oily rags or clothing?
Where not?
Are all fire pails filled?
Are sawdust and sand pails filled and properly distributed?
When was last fire drill conducted?
How many possible exits in case of a panic?
How is gasoline stored?
How can the fire protection be improved?
Are all toilets clean?
Is ventilation adequate?
Is any spit upon floor noticeable?
Where?
General Remarks and Suggestions.—If you can offer any suggestion which you believe will aid in bettering the shop conditions, write it down here.
Post this record conspicuously, and later file it away for possible further examination.

MAINTENANCE INSPECTION

Date. Name of school.
Department. Inspector.
Improvements urgently needed.
Can condition of belts be improved?
How?
Have machines been properly oiled?
When and how is oiling done?
Are floors oil soaked?
Is the oil reclaimed from the chips?
What is done with the chips?
Can you suggest more convenient methods of handling oil and chips?
What are they?
Can arrangement of machines, tools, or other equipment be changed so as to improve speed or simplicity of operation?
What?
Is each machine fully equipped with all required gears, wrenches, etc.?
In what respect are the various machines lacking?
What machines are not properly cleaned?
What bearings are loose or worn?
Are the lathe centers true?
Are any machines otherwise in need of repair?
Give names of machines which have been idle more than three hours per day.
Why is this so?
Discuss each machine separately.
Can you suggest ways the machine can be more useful?
What are they?
Keep this inspection record on file for further study and reference.

As our vocational schools give training in the trades of the machinist, carpenter, printer, sheet metal worker, electrician and many others, a boy studying one trade does not limit his safety inspection to his own department but also covers all the other departments. The most constructive suggestions of the boy inspector generally relate to his own department, but nevertheless his experience in seeking out danger points in other departments broadens him and enables him to appreciate the dangers in other

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lines of work that otherwise he might never know. Also the different point of view with which he looks upon the machines in other departments often shows up hidden or neglected danger points.

To facilitate the work of the inspector when covering departments other than his own, all danger points and gear guards are painted a conspicuous color and in some schools the word "Danger" is lettered upon all guards and dangerous points.

The inspection work is carried on first by the older and more experienced boys, but if time permits, all boys in the school should have several opportunities for making formal inspections.

Great emphasis is laid upon the desirability of all boys making suggestions that they believe will better shop conditions. The boys are trained to be on the alert at all times to find some way of improvement. It is this alert, observant, resourceful attitude that every employer hopes to find in his employe. Therefore, if this characteristic can be developed in our vocational school boys along with an appreciation of all that the "Safety First" movement stands for, the schools have certainly accomplished a worthy task.

Suction System for Grinding Room

THERE are few industrial institutions spending as much money for safety work and for the improvement of working conditions as is the Ford Motor Company, of Detroit.

The company has found by actual experience that money spent for safety work is well invested.

The accompanying photograph shows one of the tool grinding rooms at the Highland Park plant. The suction system which has been installed to

Tool Grinding Room Equipped with Suction System. Ford Motor Company, Highland Park Plant

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remove the dust from this department is most practical and efficient.

There is an adjustable cast iron guard over each emery wheel which is connected with the suction pipe by a universal joint of cast iron and also a sleeve joint for raising and lowering so that the guard can be used at any angle or position. Each pipe is equipped with a "shut-off" damper so that increased velocity can be had in the remaining pipes when some of the machines are not in use.

All turns in pipe are at an angle of 45 degrees. Small pipes enter the mains at this angle. The velocity is uniform and there are no dead pockets.

The ventilation of this grinding room is excellent, windows letting in the direct sunlight and fresh air from outside in addition to the washed air system through which the air is heated automatically.

Sanitary pasteboard cuspidors, filled with sawdust, can be obtained at all tool cribs and each man cares for his own, disposing of it every night in air tight cans provided for the purpose.

All machines are driven by individual motors which does away with all shafts and belting, except such as come with standard motor drive equipment of some machines. This does away with hazardous oiling of shafts, pulleys, etc., which is responsible every year for a large percentage of accidents.

Operators all wear short sleeves or sleeves rolled above the elbows for safety.

Wide aisles are maintained as may readily be seen from the cut.

This room has been worked out with much care and is considered almost ideal for the purpose for which is is intended.

Combustible Roof Coverings

THE fire prevention committee of the Rochester Chamber of Commerce believes that combustible roof coverings in Rochester constitute a veritable conflagration menace. A recent issue of *Rochester Commerce*, the official publication of the chamber, contains the letter given below, copies of which have been sent to all members of the chamber of commerce:

Believing that combustible roof coverings in Rochester constitute a conflagration hazard the fire prevention committee of the Rochester Chamber of Commerce has requested authority "to endeavor to secure the passage of a city ordinance for the *gradual* elimination of combustible material for roof covering for new and repair work throughout the entire city." Such an ordinance would stipulate that fire-retardant materials be used in place of wood shingles.

Realizing that this is a matter of vital importance to the city at large and one which should receive careful consideration, your officers desire an expression of opinion from the membership. Accompanying this issue of *Rochester Commerce* is an illustrated booklet (Referendum No. 1) containing the arguments pro and con as reported in the findings of the fire prevention committee and the National Lumber Manufacturers Association. For the sake of convenience, the arguments are summarized in the forepart of the booklet. Will you, please, give this matter your careful consideration, then fill out and return at your earliest convenience the accompanying postal, which contains these statements:

1. I do.....agree with the fire prevention committee that "combustible roof coverings in the City of Rochester present a grave conflagration hazard."

2. I am.....in favor of authorizing the fire prevention committee to endeavor to secure the passage of a city ordinance for the *gradual* elimination of combustible material for roof covering for new and repair work throughout the entire city and the substitution therefor of fire-retardant materials.

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EDITORIAL

The Moral Accident Hazard

THE moral hazard of compensation insurance, or the moral hazard contributing to industrial accidents (which may be defined as the management's appreciation of, and attitude toward industrial accidents and accident prevention, including ability and desire to eliminate hazards) is undoubtedly the most important hazard not recognized in rating manuals and schedules, and often is more important than the recognized and rated hazards. It is the first to be encountered and eliminated in the "normal attack" on industrial accidents.

This hazard, while intangible in itself, is evidenced by its effects on other hazards, therefore capable of analysis by psychological methods, and capable of elimination by methods based on mental phenomena.

Evidences of the value of this hazard in any plant are expressed by many factors; for example, appropriations, public and private statements, shop rules and their execution, general conditions, housekeeping, co-operation, morale, *esprit de corps,* and many more, too numerous and diversified to list in an article of this nature.

For the purpose of consideration, the effect of the moral hazard on "Shop Rules and Their Enforcement," offers a wide field of study; especially in times like the present, when labor turnover is high, new men are coming into the different plants in unprecedented numbers, and others are leaving before they have had sufficient time to become acquainted with all the shop rules, regulations and habits. What is the difference between two plants in the same business, in the same locality, and using the same sources of labor, when one "has no trouble enforcing any reasonable shop rule" and the other "cannot attempt anything like that, every one of the men would walk out"?

Some would call the difference temperament, some executive ability. Whatever it may be, it is one direct indication of the value of this intangible and unrated moral hazard that affects the accident record so noticeably. Where shop rules cannot be enforced, the natural inference is that a wide gap exists between capital and labor, a gap which should be filled by management. The remedy of course lies in the filling of that gap. It is noticeable that this gap does not exist in the very small plant, and quite naturally many of the large progressive plants anticipated or realized the conditions, and provided the necessary economic and efficient remedies to fill the gap, but too many of the medium-sized plants, employing 50 to 1,000 men (and this group includes a large proportion of all workmen), are still confronted with the great problem of poor moral hazard, or low morale, the two terms being synonymous.

Typical excuses offered by various managements show that some fail to see the economy of safety, some give "sentiment no place in business," and some fail to see that a move toward safety on their part is humanitarian when the workmen themselves are opposed to it. Some say the economy involved is not worth the expenditures of money and energy required, and some through autocratic independence dismiss the matter

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because the advantages are not obvious to themselves, and say expenditure for safety is "like water in a rat hole."

The problem of reducing the moral hazard, therefore, takes the form of an appeal to the powers that be, and, like other mental phenomena, the methods of appealing are fully treated in psychology, and will not be discussed here.

Analyses of a large number of typical appeals show that all belong to one of two groups, either appeals to humanitarian sympathy, or appeals to economic interests. Safety engineers today are still debating the comparative value of the two methods, each opinion being based on personal experiences and success or failure of one or the other method in a particular case. The author holds that the economic appeal with or without the support of the sympathetic appeal is the correct method to attack the moral hazard. This conclusion follows logically from the assumption that industry is organized and maintained by capital for the purpose of making money, rather than for the purpose of giving pleasant and profiable employment to labor, which is at best a secondary consideration and often considered a necessary evil.

There is, however, a bond of sympathy between all mankind, which is neither overlooked nor estimated, but if this be the supreme motive for safety appropriations, safety becomes a charity. If economy is the deciding factor, safety becomes a business, and a vital—not an incidental—part of the regular business operations.

In making your appeal therefore, make it economical. Consider the past accident record if that is available; consider the accident hazards—organization, physical, inherent and exposure. Consider the cost of accidents under existing conditions, making that cost include not only compensation claims paid to the injured or premiums paid to the underwriter for carrying the risk, but add to this the cost of unstabilized and demoralized labor resulting from industrial accidents. This cost is an appreciable item in total cost of production with a greater value than the more tangible figures derived from the compensation rating schedule.

The present cost of accidents being ascertained, notice how other plants have reduced the number and severity of accidents, and the proportionate reduction in operating costs. Set your mark to be obtained and notice the proposed saving to be accomplished by accident prevention activities—these are annual dividends.

Plan your activities, estimate the cost of each item, and the total gives the necessary investment in safety. Compare your dividend with your investment to get the expected interest rate, and you have the backbone of your appeal for industrial safety.

If necessary, illustrate your appeal with the frightful effects of accidents, by stories of suffering, by pictures of injuries and the injured, and obviously dangerous conditions existing. In some cases, actual contact with or observation of the injured has produced the desired effect, and in extreme cases, grewsome exhibits have worked effectively. A few rules to be remembered are: Make criticisms constructive, or if destructive, give remedial measures also; generally-speaking, base your appeal on economy, using sentiment as an illustration only. Avoid the grewsome as much as possible.

A well directed and executed appeal to a combination of senses has been used in most cases to bring about the necessary action and appropriations for attacking the other hazards in the order of their importance. The manner in which these are handled reacts on the moral hazard, and once the moral hazard is eliminated or reduced to the point where action and appropriations are available, the campaign is on for the safety engineer.

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Little Journeys in Fire Logic

No. 2—Shingle Roofs

By Charles E. Worthington

BUILDINGS burn through external exposure (other than general conflagration) in one of two ways: Either from radiant heat or flame from a structure immediately adjacent or by flying sparks and embers from more distant buildings.

In the first instance the hazard emanates from a limited number of structures, ordinarily not more than five or six. In the second, it is almost unlimited, since the radius of the hazard may include any building within a mile or even a greater distance.

It is evident that any measures of protection from the immediate exposure must necessarily apply to the outer wall construction and openings as well as the roofs. As regards the more remote exposures the danger is practically confined to the roof.

Therefore the matter of the roof covering clearly calls for serious consideration. Not only are the remoter exposures numerically preponderant but no matter how serious the immediate exposure may be, it does not justify neglect of precaution because in any case the remoter exposure continues to exist and is superimposed upon the immediate one.

Moreover, roof protection is the least expensive part of any precautionary scheme and its neglect, however bad other conditions may be, in such case serves to make a bad matter worse.

Roofs having a pitch or incline of less than four inches to the horizontal foot are usually classed as "flat" roofs; those having an incline of more than that as "pitched" roofs and are specifically known by various designations; those with a straight surface are known as "gable" roofs where but two surfaces are pitched, those pitching in four directions as "hipped," those where the incline is broken into two degrees of incline (roofs with two angles) as "gambrels." The "French" or "mansard" is a modification of the gambrel in which the lower slope is generally concave. This article will have no reference to flat roofs which will be considered later.

Two things are clearly evident in the matter of external hazard.

The steeper the pitch the less the likelihood, under ordinary conditions, of sparks or embers finding lodgment.

Strong air currents deflected by the slope may suffice to overcome the effect of a considerable angle and hold even sparks or embers of sufficient size to be dangerous against gravity. Not indeed, except under improbable conditions, against the steep lower angle of a gambrel or mansard, but quite conceivably on a slope of 45 degrees or less, like the ordinary gable roof.

The popular roof covering for pitched roofs is wooden shingles, although slate, clay tile, metal and some forms of asphalt saturated paper and felt are largely used.

Wooden shingles, evolved from straw and bark thatches, serve the primary purpose of a roof, namely, protection from heat, cold and rain, if laid on a sufficiently steep pitch to let the water run off quickly. Wood is a poor conductor of heat, but is somewhat absorbent, and as shingles are applied, would prove an inefficient covering at a less incline than the minimum quoted. The fact that shingles are made largely from timber unsuited to other uses, are generally cheap and everywhere procurable, has no doubt contributed to their popularity.

Of course convention is a factor; conservatism, the deep-rooted dislike of abandoning the old for the new, the feeling that what was good enough for our greatgrandfathers in the "good old days" should suffice also for our needs, the disposition to cling to tradition and regard upsetting innovations as vanity, or in other words habit; for the continued use of wooden shingles at this date may be properly looked upon as a mere habit fixed by long usage and carefully fos-

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tered by special interests. A habit, which like all other habits good or bad, especially bad, is hard to break even when no good excuse remains for its observance.

Even the beauty attributed to shingles must be considered as wholly conventional, since to those unaccustomed to them they are not in the least beautiful.

There is a "right side" and a "wrong side" to shingles. They must be laid right side up to shed water properly.

Wood is composed of bundles of fibers imbedded in softer substance which serves to keep them separated individually and at the same time unites them collectively.

The "right" side of a shingle, being cut at an angle to the grain, presents a series of overlapping cut ends of fibers and is in fact of itself a shingle roof in miniature.

A short exposure to sun and rain suffices to remove some of the soft material, permitting the released ends of the cut fibers to curl and the surface becomes somewhat "fuzzy." This "fuzz" is easily ignited and will conduct a flash fire over the entire surface; often intense enough to acquire permanent hold on some weak point.

It should be said that a new roof of sound shingles resists sparks very well, a fact of which the advocates of this covering have made much.

But when the ends of the fibers curl up they expose previously protected surfaces to the erosive and corrosive action of sun, rain and wind, the substance between the fibers is diminished and the bundles draw closer, causing the shingles to grow spongy and curl, at the same time opening up pervious spaces between the fibers.

This is the beginning of decay, and decay of wood is oxidization exactly as combustion is; in fact, it is a very slow fire, evolving as much heat in the long run as rapid combustion does, but so slowly as to be imperceptible.

Oxygen, however, is absorbed and held in large amounts in excess of that chemically converted and the shingle now becomes a sort of tinder (tinder is merely fibrous material forced to absorb and hold unconverted an abnormal amount of oxygen—in fact, to become an "oxygen carrier").

At this stage the combustibility (i. e., the facility of ignition) is greatly increased while the cracks caused by shrinkage and the curled edges afford easy lodgment for sparks in such manner that they are covered to an extent that conserves their heat for time enough to communicate fire to the shingle.

(A spark or ember falling upon a sound, smooth surface usually touches it at points only while the up draft caused by the heat of the spark draws in air from all directions and carries the heat away from the material beneath, but when a spark is driven into a crevice and is covered, especially above, this heat instead of being dissipated is conserved and applied directly to producing further combustion.)

The heat conductivity of the shingle in this condition is also much diminished, which also favors ready ignition by retaining and accumulating heat at the point of contact.

This happens to *all* wooden shingle roofs and the process begins as soon as the shingles are laid. The time required for conversion to a more or less pyrophoric condition is subject to some variation, according to the nature of the shingles and the climate. Economically the first cost of shingle roofs is in most localities now but little less than that of several alternative materials whose greater durability makes them really cheaper in the end.

Clearly the wooden shingle is unsuitable for roof covering and dangerous; sometimes igniting from fires over a mile away.

Customs and precedents afford no adequate excuses for perpetuating a bad habit. The pleasing appearance is illusion, depending entirely upon familiarity and the apparent economy of (in some cases) lower first cost, unreal and misleading.

Therefore, the wooden shingle as a roof covering should stand condemned.

This condemnation does not necessarily extend to the use of wooden shingles as a finish upon vertical surfaces or those approaching the vertical as nearly as the lower angle of gambrels or mansards except so far as the progression toward a pyrophoric condition affects their relation to nearby exposures.

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Even as applied to these (finish of outside walls, gambrels, etc.), they are more liable to ignition from radiant heat than unpainted clapboards and much more than painted surfaces. Hence they are not to be recommended as desirable, even for these uses, unless the location of the structure to which they are applied be one of permanent isolation. No method of "fire proofing" wooden shingles has as yet been discovered, nor even of making them reasonably spark-resistant, when applied to roofs for any considerable period, that is not open to objections which may not be overcome on grounds other than fire hazard.

Safety Standards for Cranes

Code Proposed for the Consideration of the Sub-Committee on the Protection of Industrial Workers of the American Society of Mechanical Engineers.

THE following standards apply to cranes, which are regularly used in and form part of a permanent industrial plant. In addition to Electric Traveling Cranes, these regulations are to cover Gib Cranes, Monorail Cranes, Hand Power Cranes, and other hoisting apparatus of a similar nature, in so far as the various sections apply. The provisions of all Safety Standards issued by the Society shall* apply in cases not specifically covered herein.

Caution: Employes shall not remove or make ineffective any safeguards while they are in use, except for the purpose of making repairs, and safeguards so removed shall be replaced when repairs are completed.

ELECTRIC TRAVELING CRANES — GENERAL CONSTRUCTION.*

1. Proper provisions for strength shall be made for all parts subject to impact and rough usage. Journals and shafts shall be of sufficient size to bring the pressure within safe limits.

2. All apparatus shall hereafter be designed throughout with not less than the following factors of safety, under static full rated load stresses, based on the ultimate strength of the material used:

(*a*) All gears, and complete hoisting mechanism, factor of not less than 8.

(*b*) All other parts, factor of not less than 5.

3. Calculations for wind pressure on outside cranes shall be based on not less than 30 pounds per square foot of exposed surface.

4. Cranes should be of what is known as "All Steel Construction;" no cast iron should be used except for such parts as drums, bearings, brackets, etc. No combustible material should be used.

5. All bolts should be of the through type, and be equipped with approved lock nuts or lock washers.

6. Where access to the crane is necessary, steps or stairs with hand rails should be used.

7. Platforms should be provided for changing and repairing truck wheels on end trucks and have stairways leading to them.

8. A platform or footwalk to give access to the crane shall be provided, which is accessible from one or more fixed ladders or stairways, and shall be not less than 20 inches in width.

9. A footwalk shall be placed along the entire length of the bridge on the motor side except when the construction of the crane prevents or when such a platform would not ordinarily be used for the repair or maintenance of the crane. This walk should be at least 6 feet 6 inches below the bottom of the overhead trusses.

10. Footwalks should be placed across the ends of the trolleys at right angles to the bridge walks. When so placed they shall be not less than 12 inches in width.

11. Footwalks shall be of substantial construction and rigidly braced.

12. On cranes hereafter erected no openings shall be permitted between the

*The word "SHALL" where used is to be understood as mandatory and "SHOULD" as advisory.

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bridge footwalks and the crane girder. When wire mesh is used the mesh opening must not be greater than ½ inch.

13. Each footwalk shall have a standard metal railing and toe-guard at all exposed edges wherever practicable.

14. Not less than 12 inches actual clearance should be allowed between highest point of a crane and the overhead trusses, and not less than 2 inches between any part of the crane and building, column, or other stationary structure. Where there are more than two crane runways in parallel there should be a clearance of not less than 24 inches between the extremities of the cranes.

15. Means of escape shall be provided for operators of hot-metal cranes.

16. The operator's cage shall be located at a place from which signals can be clearly distinguished and be securely fastened in place and be well braced, to minimize vibration. It shall be large enough to allow ample room for the control equipment and the operator. The operator shall not be required to step over an open space of more than 18 inches when entering or leaving the crane.

A pail filled with sand or an approved fire extinguisher shall be carried in the crane cage for use in case of fire.

17. An approved foot- or hand-operated gong, or other effective warning signal, shall be placed in a location convenient to the operator and be securely fastened.

18. Ladle and other cranes subjected to heat from below should have a steel-plate shield not less than ⅛-inch thick and placed not less than 6 inches below the bottom of the floor of the cage.

19. The cages of cranes hereafter erected shall be of fire-resisting construction.

20. All gears on cranes hereafter erected shall be provided with standard guards. This should apply to all existing cranes where practical.

21. No overhung gears shall be used unless provided with an effective means of keeping them in place, and keys shall be secured in an approved manner to prevent the gears from working loose.

22. Unprotected keys shall not be left projecting from ends of shafts.

23. The construction of the crane shall be such that all parts may be safely lubricated when the crane is not in operation.

24. The installation of the switchboard, wiring, and all electrical equipment must fully comply with the United States Bureau of Standards regulations or the identical Pennsylvania Industrial Board Standards.†

25. There shall be a main-line switch or its equivalent so arranged as to cut off all power from the crane, and so constructed that it may be locked in its open position.

26. Open-type controllers shall have an asbestos-lined steel guard over the movable contact parts, both to protect the operator's eyes and to prevent articles from falling on contact parts.

27. An approved hoist-limiting device should be provided for each hoist.

28. Suitable brakes shall be provided for the hoist and bridge travel Each hoist shall be equipped with effective brakes which shall be capable of sustaining at least 1½ times the full-rated load.

29. The drums on cranes hereafter erected shall have a flange at each end to prevent the ropes from getting off the drum, and be so designed that there will be not less than 2 full wraps of hoisting cable in the grooves when the hook is at its lowest position.

30. The hook block shall be of a type so arranged that it will lift vertically without twisting.

31. Bottom sheaves shall be protected by close-fitting guards, to prevent the rope from becoming misplaced.

32. Crane bumpers shall be provided, and shall be at least one-half of the diameter of the truck wheel in height. Both truck-wheel and trolley bumpers should be fastened to the girder and not to the rails. Bumpers shall be built up of plates and angles, or be made of cast steel.

33. Truck fenders shall be installed which extend below the top of the rail and project in front of all bridge and trolley track wheels, and shall be attached to the trolley or the bridge and frame. They shall be of a shape and

†The Pennsylvania Department of Labor and Industry co-operated with the National Bureau of Standards in preparing its code, and immediately upon its completion the Pennsylvania Industrial Board adopted it as the required practice for the State.

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form that will tend to push and raise a man's hand, arm, or leg off the rail and away from wheel.

34. Heavy safety lugs or brackets shall be placed on trolley frames and bridge end carriages, to limit drop to 1 inch or less if a wheel or axle should break.

35. A capacity plate showing the maximum capacity of each hoist in pounds shall be placed on each crane girder in such a manner as to be clearly legible from the floor.

36. A metal tool box or receptacle shall be permanently secured in the cage or on the runway for the storing of oil cans, tools, etc.

37. The trolley should be completely floored.

38. Cranes in outside service shall have the following additional provisions:

(*a*) Floors of footwalks shall be so constructed as to provide proper drainage.

(*b*) The cage shall be enclosed and of fire-resisting construction; there shall be windows on three sides of the cage, and windows in the front and the side opposite the door shall be the full width of the cage.

(*c*) The floor of the cage on outdoor cranes should be extended to an entrance landing which shall be equipped with a handrail and toe-guard of standard construction.

(*d*) Where there are no members over the crane suitable for attaching blocks for repair work, a structural-steel outrigger should be arranged on the crane of sufficient strength to lift the heaviest part of the trolley.

39. All gantry cranes should be equipped with automatic warning signals.

40. The truck wheels of gantry cranes shall be provided with guards or fenders.

OPERATION OF CRANES—RULES FOR OPERATORS.‡

1. Cranes shall be operated only by regular crane operators, authorized substitutes, crane repairmen, or inspectors; no one else should enter a crane-cage.

2. Hands shall be kept free when going up and down ladders. Articles which are too large to go into pockets or belts should be lifted to or lowered from crane by hand line (excepting where stairways are provided).

3. Cages shall be kept free of clothing and other personal belongings. Tools, extra fuses, oil cans, waste, and other articles necessary in the crane cage shall be stored in a tool box, and not left loose on or about crane.

4. The operator shall familiarize himself fully with all crane rules and with the crane mechanism and its proper care. If adjustments and repairs are necessary, he shall report the facts at once to the proper authority.

5. The operator should not eat, smoke, nor read while on duty nor operate the crane when he is physically unfit.

6. The operator or some one specially designated shall properly lubricate all working parts of the crane.

7. Cranes shall be examined daily for loose parts or defects.

8. Cranes shall be kept clean.

9. Operators shall avoid, as far as possible, carrying loads over workmen; this must be absolutely avoided when carrying molten metal or when using a magnet.

10. Whenever the operator finds the main or emergency switch open, he shall not close it, even when starting on regular duty, until he has made sure that no one is on or about the crane, and he shall not oil nor repair the crane unless the main switch is locked open.

11. Before closing the main switch, the operator shall make sure that all controllers are in "OFF" position.

12. If the power goes off, the operator shall immediately throw all controllers to "OFF" position until the power is again available.

13. The operator should not reverse a motor until it has come to a full stop, except to avoid accidents.

14. The operator shall pay special attention to the block, when long hitches are made, to avoid tripping the limit

‡The committee consulted all available sources for making the code and notes practical and effective. In constructing the rules for operation they found it desirable to follow largely the practice already established, such as that adopted by the National Foundrymen's Association.

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switch or running the block upon the drum.

15. The operator shall recognize signals only from the one man who is supervising the lift. Operating signals should follow an approved standard; they should be manual, never verbal. Whistle signals may be used where one crane only is in operation.

16. Before starting to hoist, the operator shall place the trolley directly over the load to avoid swinging it when being hoisted. This precaution is especially important when handling molten metal.

17. The operator shall not make side pulls with the crane except when especially instructed by the proper authority.

18. When handling maximum loads, particularly ladles of molten metal, the operator shall test the hoist brakes after the load has been lifted a few inches; if the brakes do not hold, the load should be lowered at once and the brakes adjusted or repaired.

19. Bumping into runway stops or other cranes shall be avoided. When the operator is ordered to engage with or push other cranes, he shall do so with special care for the safety of persons and cranes.

20. When lowering a load, the operator shall proceed carefully and make sure that he has the load under safe control.

21. When leaving the cage, the operator shall throw all controllers to "OFF" position and open the main switch.

22. If the crane is located out of doors, the operator shall also lock the crane in a secure position to prevent it from being blown off or along the track by a severe wind.

RULES FOR FLOORMEN

1. Floormen shall give all signals to the operator in accordance with approved standards, preferably manual.

2. Floormen shall be responsible for the condition and selection of all hoisting accessories and for all hitches.

3. Before the operator moves a crane upon which an empty chain sling is hanging, the floorman should hook both ends of the sling to the block.

4. Floormen where necessary should walk ahead of a moving load and warn people to keep clear of it. They shall see that the load is carried high enough to clear all obstructions.

5. Floormen shall notify the foreman in advance when an unusually heavy load is to be handled.

6. Floormen shall not ride nor allow others to ride on the hook or load.

RULES FOR REPAIRMEN

1. Repairmen should have a crane that is to be repaired run to a location where the repair work will least interfere with other cranes and with operations on the floor.

2. Before starting repairs, repairmen shall see that all controllers are thrown to "OFF" position; that main or emergency switches are opened; one of these shall be locked.

3. Repairmen shall immediately place warning signs or "OUT OF ORDER" signs on a crane to be repaired and also on the floor beneath. If other cranes are operated on the same runway, they should also place rail stops at a safe distance or make other safe provision.

4. When repairing runways, repairmen shall place rail stops and warning signs or signals so as to protect both ends of the section to be repaired.

5. Repairmen shall take care to prevent loose parts from falling or being thrown upon the floor beneath.

6. Repairs shall not be considered complete until all guards and safety devices have been put in place and the block and tackle and other loose material have been removed.

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The Fire Menace of Railroads

By Alexander Brociner

Consulting Engineer, New York City.

From a paper read before the New York Chapter of the National Fire Protection Association.

THE purpose of this paper is to call attention to the fire menace due to railroads.

Well informed persons are quite familiar with the fact that enormous losses have been caused to forests by sparks from locomotives. In some States over 50 per cent of such fires are from locomotive sparks, and if we consider the forest fires in the United States have caused an average annual loss of about 100 human lives, the destruction of trees worth at least $40,000,000, the loss of livestock, crops. etc., to the amount of many millions we can realize what a destructive factor the sparks of locomotives are.

The far western States and some ot the States of the middle west have been the greatest sufferers from this fire plague.

Out of 3,138 fires reported in 1909 by the United States Forest Service 1,186 were caused by locomotives and their setting was due to three principal causes:

1. The use of coal as fuel.
2. The lack of proper clearing of the right of way.
3. The non-use or misuse of spark arresters.

To prevent the innumerable forest fires set by locomotives, oil must be used as fuel. An efficient spark arrester, which will keep large, glowing embers from being thrown out into the dry grass, brush or debris usually along the right of way, will assist greatly, but not entirely prevent such fires. The difficulty lies in securing a wire screen with the mesh small enough to catch the sparks, yet not so small as to interfere with the exhaust. The use of a large meshed screen is being made possible to some extent by special arresters which catch the large cinders in a cuplike rim on the inside of the stack, on the theory that the heavier sparks under forced draught are held by centrifugal force close to the perimeter of the stack; therefore, any such obstruction properly placed on the inside of the stack should stop the large cinders which are the main cause of fires. On heavy grades in the mountains, where full and forced exhaust on engines is required, most of the spark arresters now in use interfere with the draught and as a result, the wire screens must be knocked out so that the engine may get the steep grades. Modern locomotives have a return draught by which the larger cinders are forced back to the firebox before being emitted through the stack. The only effective way to prevent the locomotive sparks which escape from starting forest fires, is to clear the right of way of all inflammable materials. The United States Forest Service, together with various forest fire protective associations, has formulated a number of rules and regulations intended to eliminate as far as possible the causes of forest fire outbreaks.

It is necessary to patrol the right of way immediately after every heavy freight train by a man on a speeder.

Caches of fire-fighting tools and extinguishers should be provided at each section house and other stations along the right of way.

Telegraph and telephone stations along the railroad lines are of great importance for the giving of the alarm and summoning assistance.

Locomotives shall be used as fire engines and the crew of each train shall form a well organized and equipped fire brigade.

The Pennsylvania Railroad Company has the most complete and efficient fire fighting apparatus and crews. It has 612 locomotives equipped with powerful and special fire extinguishers and a well organized fire department of its own.

In order to reduce the number of forest fires, due to sparks of locomotives, Secretary Wilson, during President Taft's administration, signed

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special agreements with the Northern Pacific and the Great Northern railroads, whereby they bound themselves to clear a strip of 200 feet beyond their rights of way and to provide spark arresters and safety equipments for their engines. In addition to this, their employes were to report at once the discovery of fires and call their fire companies from the nearest telegraph or telephone station.

Since the courts have sustained the right of the Department of Agriculture to collect damages from railroad companies whose lines pass through the national forests for fires which they cause, there is a strong inducement for the railroad companies to be associated actively with that department in fighting this fire menace.

In many localities, progress has been made in forest fire protection. Organized fire protection has been established in the national forests and in most of the State forest reservations. A number of States have begun to develop systematic fire protection on private forest lands through the organization of State fire wardens. In some instances, private owners have formed co-operative associations for fire protection and employ a regular force of rangers for fire patrol.

Throughout the entire country, here and there, a serious effort is being made to protect the forests from fire; especially from fires started by sparks of locomotives.

Let us take a step further and consider the danger of fire due to railroads for the populated centers they pass through. It is a common sight all along the railway lines of the United States to find isolated dwellings or groups of dwellings, villages and even larger cities, on either side of the tracks and as close to them as the right of way will permit. Structures bordering on the right of way are very often as close as 5 or 6 feet to the nearest track. The buildings, many times, are of the flimsiest type of construction with shingle roof and wall coverings. Thousands of such houses have been burned to the ground from fires started by sparks of locomotives igniting the easily inflammable roofs and many persons have been rendered poor or homeless. The records of fire departments throughout the entire country contain reports of a great number of fires started by locomotives.

Factories of ordinary wood construction, as well as warehouses containing highly inflammable chemicals, and often powerful explosives, can be found in close proximity to railroad tracks, without the slightest fire protection. Such buildings have been razed to the ground by fires started from the sparks of locomotives, and have thereby put in danger whole sections of densely populated blocks. Lumber and coal yards, great oil tanks, planing mills, with their great stacks of lumber, most of it in the form of thin boards, moldings and shingles, are also found dangerously near railroad tracks, ready to go up in flame and smoke at the first touch of a burning ember from a locomotive.

Even railway stations, roundhouses and shops are permitted to be built of wood and in some places we find small stations having shingle roofs.

The percentage of loss in this class of property is high, and the destruction entails a loss above the actual value of the property in crippling operation and resultant loss of revenue. Reports of the committee of statistics and forms of the Railway Fire Protection Association showed a loss for the 5-year period from 1909-1913 of approximately $731,000 on stations and warehouses, out of a total of $6,158,000 of railroad property destroyed by fire.

To these figures should be added a percentage of loss on "merchandise in transit" destroyed in buildings, bringing the loss on this class of property to about one-sixth of the total, about $1,000,000. It seems to be a universal practice of railroads to erect minor cheap, inflammable buildings around car shops and motive power buildings; oil houses, storage buildings and rest rooms are often old box cars.

The relative value of railroad property destroyed shows that sparks

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from locomotives occupy about second place of all hazards involved in the destruction of railroad property. While the condition of front ends and ash pans of locomotives may be classed as the primary cause of fires started by sparks and cinders, auxiliary causes may be engines running with their damper doors open or not entirely closed, through carelessness of the enginemen or cinder-pit men. What may be termed secondary causes are the bad condition of shingle roofs, platforms, trestles, roofs of wooden cars, exposed inflammable merchandise in cars, and rubbish about buildings, where a spark may land and start a fire. If these auxiliary and secondary causes were taken care of, the result through the primary causes would be reduced to a minimum.

A considerable hazard in connection with depots, freight houses, warehouses, towers, coaling stations and other miscellaneous properties along the line of the road is the storage of oil supplies without proper safeguards, undoubtedly one of the most difficult hazards to guard against. On railroads having little fire prevention supervision, small supplies of oil will be found scattered around throughout the various station buildings, quantity and location depending upon the use it is put to and convenience of the user. At many places the oil supplies will be surrounded by an oil soaked floor and small quantities of oily waste and rags will be in evidence. No thought whatever is given to the hazard involved. The dangers of such storage without proper precautions are evident particularly where floors become thoroughly saturated from constant lamp filling drippings.

The fire loss records of the railroads of this country show us that too little attention is paid to safeguarding against fire the so-called country station, with values ranging from $1,000 to $5,000.

The public at large does not seem to realize the importance of the fire peril due to railroads nor the great losses caused by them, notwithstanding the fact that such sad accidents occur every year in great numbers, sometimes in the neighborhood of large cities.

The insurance companies consider the sheds, warehouses, and storage rooms on docks the most hazardous risks that they can write and the rates are in many cases exorbitantly large. Many companies refuse to insure goods stored in these sheds on the docks. More than half the piers are wooden affairs built on wooden piles driven in the mud of the river and covered with planks. Some of these piers have wooden sheds and warehouses constructed at the end or extending the full length of the piers. These sheds and warehouses, as a rule, have not the proper fire protection, consisting of sprinklers and fire lines, and are exposed to fires, which may be caused by railroad locomotives, which very often haul cars on tracks laid on piers from which the cars are transferred to railroad floats.

From the standpoint of insurance it is not difficult to estimate the value of railroad structures, machinery, equipment and merchandise stored, but it is almost impossible to figure out the fire loss on rolling stock and on merchandise in transit, which may be concentrated in enormous quantities at certain points. Big losses in railroad properties and merchandise in transit, as well as in private property of all kinds and, above all, very regrettable losses in human life have resulted from fire caused by collisions and derailments.

A study of the waterfront of New York City and vicinity will disclose the existence of great fire dangers.

The fire danger from the sparks and cinders of locomotives is not limited to combustible materials and buildings situated near, or too near, railroad tracks, but it includes, to a great extent, bridges and trestles.

Railroad bridges and trestles whose structural members are of wood as well as steel, and bridges whose tracks are laid on wood ties are all liable to catch fire from the sparks of passing locomotives or from hot cinders dropped from a locomotive fire-box.

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The development of the use of electric power for the operation of trains and street cars has brought about also a permanent fire menace to all structures carrying them and to the combustible buildings in their vicinity. A short circuit can ignite inflammable materials as easily as the sparks or hot cinders of locomotives. It is not long ago that by sheer luck, we were spared a great catastrophe in the neighborhood of New York City caused by an electric train.

Many fires due to electric trains have taken place in various parts of the country and even the great bridges spanning the East River have not been spared from such occurrences. A number of fires have been started in the New York subway in various ways by the high tension electric current used there. It is not necessary to give statistics of dates nor of the losses incurred, but it is known to everybody that the greatest dangers to passengers lurk on every side in these tunnels.

The fire danger of railroads is always there, by the very nature of their motive power. Therefore, we must not be too optimistic about it and dismiss the matter with a smile and a shrug of the shoulder. We must not wait until an "Asche disaster" of another type shall arouse the public and respective authorities to the realization that we must do something to reduce the fire losses and the fire risks caused by railroads.

The elevated railways of New York present at almost every turn great fire hazards, not only along their lines but also at their various stations, terminals and yards. Wooden cars, creosoted wood ties and platforms, wooden stations and stairs, wooden signal towers, etc., all furnish excellent fuel for a roaring fire which may be easily caused by a defective power shoe or by a short circuit of some other origin.

We all remember the terrible accidents which have taken place in the past on the elevated roads of New York, accidents which resulted in the burning up of the wooden cars and ties and the loss of many human lives. What has been done to prevent a greater disaster in the future?

The principal causes why the fire menace of railroads is so great in the United States are, in the first place, the lack of proper and uniform laws and regulations for the safeguarding of property and human life, laws and regulations the infraction of which should be punished severely, and in the second place, lack of authority by the various federal, State and city departments, having jurisdiction over the matter, to strictly and effectively enforce such laws wherever they exist.

The most important railway companies in the country have realized that it pays to prevent fires and have started a systematic campaign to eliminate the causes of fire as well as to install proper fire-fighting apparatus. They have also begun to build more wisely their stations, shops, and warehouses, leaving out inflammable materials. Railroad ties of concrete and steel have been used in many places with very good results not only because they are more durable, but also on account of their lack of inflammability.

Railroad locomotives equipped for fighting fires are now in use by the most progressive companies; train crews are instructed to report fires and are properly trained to fight them.

The most important railway yards or terminals have very good fire protection.

The most modern types of railway cars used are of steel and the inflammable material in them has been reduced to a minimum.

The plans and specifications of all proposed railroad buildings should be examined by a fire prevention engineer. All fire hazards should be carefully studied and if they cannot be eliminated they should at least be surrounded with the most effective safeguards.

Fireproof or fire retarding material should enter into the construction of railroad buildings to as large an extent as possible. Fire walls, fireproof doors and windows, proper insulation

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of electric conduits, the elimination of closets under stairs where inflammable material may accumulate, all these promises should be practically enforced.

At stations where coal and small supplies of oil, gasoline, waste, lampblack, or similar material, for local use are kept, a small inexpensive house or box should be provided at a safe distance from main building for their care. Fuses and torpedoes should be kept in this house, or a small rack arranged so as to separate the two, provided.

In construction of stations, consideration must be given to environments, locations near hazardous risks avoided, and a safe separation of buildings maintained. This separation must be governed by the material entering into the construction of buildings, height and area of buildings, and the nature of their contents, that is, the possible intensity of heat generated by a fire.

Industrial encroachments, such as seedhouses in the cotton territory are usually of light inflammable construction, poorly maintained, and form dangerous environments for stations. In their location, rules of safety should not be lost sight of for convenience of operation. A safe distance should be maintained between stations and local oil distributing plants. Oil tanks should be located on ground sloping away from railway property; placed in basins, or surrounded by enbankments to prevent the flow of oil on to the railway property.

Shipments of inflammables and explosives must be handled in strict conformance to published rules of the Bureau of Explosives.

All freight must be kept neatly and systematically stacked preferably in center of wareroom, with clearance left at walls. It must never be placed so as to interfere with the easy accessibility and operations of fire protection. Disposition of refused or damaged freight, particularly that of hazardous nature, should be promptly made and buildings relieved of such storage.

If trash cars are used for disposition of rubbish, they should be spark-tight, with close fitting doors; kept free from oils, waste or rags, unslacked lime or other material liable to spontaneous ignition, and the doors kept closed except when in actual use. Signs designating their use and with the words "Keep Fire Away" should be posted. Cars should be stored where easily accessible to engines so they can promptly be removed in case of fire.

At stations where large amounts of trash are burned yard incinerators should be provided.

Caboose, shanties or other cars containing stoves or lamps should not be parked where exposing buildings.

All railroad buildings should be provided with the most modern fire-fighting equipment and the railroad yards should have fire lines with powerful pumps so as to reach every point exposed with a good stream of water.

Fire alarm systems should be installed wherever required and should be connected with the fire departments of the city or neighboring communities.

We must remember that we cannot expect from the railroad companies only relief from the fire menace of railroads.

We must also have and strictly enforce rules and regulations for the erection of buildings located near railway lines, but which are not railroad property.

European countries all recognized long ago, the importance of the fire menace of railroads and most of the cities and even villages, have stringent regulations intended to reduce this fire hazard.

It was impossible for me to obtain from abroad in these war times types of the rules and regulations for the prevention of fire caused by railroads but I have succeeded in finding a copy of the police regulations of the city of Altoona, Germany, promulgated July 6, 1895.

Here are a few interesting paragraphs:

1. Buildings and part of buildings which are

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not constructed of fireproof materials and are not protected against ignition by locomotive sparks must be at a distance of at least 4 meters (about 13 feet) from the nearest track. Same thing applies to all buildings having openings which are not glazed with glass at least one centimeter (about ⅜ of an inch) thick.

2. Buildings with easily combustible roofs must be placed at a distance of at least 25 meters (about 82 feet) from the center of the nearest track. If the rails are on an altitude of say 10 meters, then the distance to the buildings shall be 25 plus 10 plus 10½ equal 40 meters (about 131 feet).

3. Provisions of paragraph 2 apply also to all buildings containing easily inflammable materials and having openings not protected by glass one centimeter thick.

4. Easily inflammable materials which are stored without fireproof roofs over them or otherwise protected against fire and sparks, shall be at a distance of at least 38 meters (about 125 feet) from the nearest track.

What has been found necessary to regulate in Europe in order to reduce fire losses due to railroads must be regulated also in this country.

Shingle roofs and wall coverings should be absolutely prohibited from any building nearer than 25 feet to any railroad track.

All buildings nearer than 10 feet to the railroad tracks should have roof and wall coverings of incombustible material.

Lumber and coal yards should be permitted only when located 100 feet or more from the nearest tracks, and should have their materials covered with incombustible roofs.

Oil or gasoline tanks and reservoirs should be permitted only 150 feet or more from a railway line; the same prohibition should be placed on warehouses and factories containing easily inflammable materials.

All important bridges and trestles of steel or wood should have a properly installed fire extinguishing system consisting of the most modern appliances, preferably having well protected water mains and hydrants, and should have also, at suitable distances fire alarm stations with sufficient water hose and fire-fighting tools.

Regarding the elevated roads and the subways of New York we must insist that something shall be done to eliminate the fire hazards and to safeguard the lives of the passengers.

An energetic campaign should be started to bring those who are responsible for the present situation to the realization that with the terrible congestion of traffic on the subway and elevated lines we may expect every minute a disaster which will stagger our imagination with its *loss of human life.*

Post mortem investigations and recriminations will not bring back those lives which may have been sacrificed on the altar of ignorance, carelessness, and greed.

Toll of Pennsylvania Industries

ONE death every three hours! That at present is the industrial toll of Pennsylvania, and unless employers install safety devices, organize safety departments, and generally look better after the interests of the workers, this terrible slaughter will not abate.

Those were the statements made by Dr. John Price Jackson, State commissioner of labor. He was commenting on the appalling loss of life in the industries of the State during the past year.

Figures just made public show 251,488 persons were killed or maimed last year in industrial establishments in the State. The total deaths for the year are 2,587, an average of eight a day, excluding holidays and Sundays.

The commissioner suggests that the workers form safety committees in shops, where the union has none, and that the committees aid in getting proper safety provisions.

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 259 ALL INDUSTRIES — EFFICIENT EDUCATION.—Present day appreciation of the results of personal injuries leads to an investigation of the causes of accidents and the necessary steps for their prevention. Every study of accidents reveals that carelessness on the part of the injured or of some other person is responsible for the majority of injuries. We all concede that the practical method of overcoming carelessness is by education. It is true that inspection, safeguards, signs and safety committees are all necessary in the plan of education. Yet having all these factors every employer is troubled by the fact that it still seems a most difficult problem to educate the whole force to the point where he is satisfied with a reduction of the accidents attributed to carelessness.

General experience in the life of the average workman has been such that he now has a pretty fixed idea as to how capable he is of taking care of himself. This opinion, no doubt, is due to the long period of time where former practices compelled him to assume all manner of risks and almost the entire liability. Where a man takes chances without injury he is certain to have less feeling that the next time will likely mean an accident.

Almost everyone is impressed with the principles of "Safety First" but real education, the most efficient factor, is by far the most difficult thing to accomplish.

Legislation should be enacted which will place the study of accident prevention in each public school to be begun at the same time with the other elementary subjects. We feel it our duty to teach a child to read and write so that he can win his way. Can you consider his education complete if he has not thoroughly learned that one careless act may undo in a second the results he hopes to gain from the application of the other principles he has mastered?

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No. 260 VARIOUS INDUSTRIES — DIRECTIONS FOR "HEAT TREATING" CHAINS. — Do not "anneal" chains. Annealing, as generally understood and carried out, is more likely to injure than to benefit soft steel or wrought iron chains. Simply heat them as directed below and allow them to cool naturally.

Wrought iron or soft steel chains should be "treated" once a year, to remove crystalline structure and put them in a condition having maximum toughness, as follows:

Heat to 950 degrees C. on the hearth of an ordinary heating furnace; hold at this heat for from 15 to 30 minutes; remove and allow to cool on the floor.

Whenever chains have to be repaired at the blacksmith shop such repairs should always be followed by the above treatment.

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No. 261 THE HUMAN FACTOR VITAL TO MINE SAFETY.—The multiplication of mechanical devices to safeguard the life and limb of employes has been marvelous during the last few years, and has resulted in the accomplishment of much good along the line of prevention of accidents. Beyond the mechanical devices for safety, there will always be the human factor with which to reckon in the final analysis. It is obvious that no mechanical devices can counteract the chronic carelessness of an employe; the element of chance which may yield him an additional car of coal within the day; the riding of a "trip" to the

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mouth of the "pit" to eliminate a walk of a mile or more; crossing in front of a motor to cut distance, or the toying with the electric current in order to determine how much "juice he can take." Among the safeguards against accidents used by my company is the maintenance of a well organized mine safety department in which are constantly given instructions in the use of self contained oxygen apparatus; practice in first aid to the injured; the study of causes of fatal accidents and the discussion of means of accident prevention through mine safety meetings; the holding of annual mine safety demonstrations for the purpose of arousing interest through competition for prizes in efficiency, and the offering of cash bonuses for the reduction of mine accidents.

From its operating standpoint, the company tries to maintain a high standard of discipline among officials and men. It insists upon mine officials holding first certificates from the American Red Cross Society or United States Bureau of Mines, and is opposed to the use of intoxicating liquors by its officials. A regular system of inspection, which has greatly reduced a number of accidents is maintained, as follows: Three daily inspections by officials, a semi-monthly inspection by the company mine inspector and frequent inspections by the mine officials.

The causes of all accidents are investigated by the company mine inspector and by the foremen. Every practical safety device applicable to mining is used; warning boards are to be seen wherever they can be of service. Another means of preventing accidents, used by the company is conducting a night school for its employes in which they may make an intensive study of the State mining laws; the rules and regulations of the company and a general study of mine management; and instructions in general subjects pertaining to their work which gives them a broader vision of life and brings to them the individual realization of the fact that they are truly their brother's keeper.

The public school has its part in the prevention of accidents in the mines through a course of instruction in first aid and the mining law. All children are required to do this work for the reason that 75 per cent of our employes are non-English speaking, and the only way to reach the employe is through the school children, who discuss the salient features of mining and accident prevention with their parents in their own native language.

Another important feature in the prevention of mine accidents is an attempted regulation of the distribution of intoxicating drinks by the sociological department of the company. It is a well known fact in all mining communities that accidents are more frequent after holidays and celebrations of whatever sort. These accidents can be traced directly to the consumption of intoxicating liquors.

It is the opinion of the officials of this company that the sum total of all these precautions taken for the prevention of mine accidents is directly responsible for the reduction of accidents.

"The best safety device is a careful man."

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No. 262 VARIOUS INDUSTRIES—THE NEED OF THE DEVELOPMENT OF SAFETY.—When we try to trace safety back to its origin, we find that it is not altogether in its infancy, though it is still in a state of crudeness and undevelopment. Safety has been practiced in a way for a number of years, but through lack of interest and knowledge of its value, it never received proper attention and was almost a failure until the last few years. In some cases it is hindered in the same way at the present time.

Generally, we find to-day that the whole world is awakening to the fact that safety in all branches of industry is an important feature and a paying proposition, no matter in how small a way it is employed.

But there are some of us who need to be helped out of the old rut, as many men may be doing one thing, while their minds are on something else. Before they know it, the enemy has taken

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hold of them and has removed a finger, a hand, a foot, an arm or a leg. It is then too late to watch, for the member is gone.

This reminds the writer of places he visits, makes a safety lecture and does all he can to educate careless employes in safety work and practices. We get them started off just right and every thing is working smoothly. On the next visit to the plant they are back in the same old rut. They do not do this intentionally but just go to sleep "on the job" for lack of the proper interest being employed.

The safety movement is one of the greatest things that has been made in our country. It has as broad a field for development as the mineral fields of our country had before coal was introduced as a fuel. After coal was introduced it took men with backbone and means to push this wonderful discovery into existence. To-day it is a product that we can not do without. All that safety needs to make it just as necessary as coal is men behind it with the backbone and never tiring nerves to teach it; to show others how to practice it and to set the example themselves. Finally, we will find that everything we do or have others do will necessitate some safety precautions before the work starts, just as coal must be put into the fire box of a locomotive before it can turn a wheel by its own propelling power.

In reviewing the situation we need not take any special subject, as when we look around we can see good material everywhere to help promote the safety movement. What many of us need is to wake up and be The Men On The Job and not the "deadheads" about the premises.

The average inspector will agree with me that hardly a day passes when he does not see something he could use in promoting safety. I recall an instance that happened under my own observation just a short time ago. I was at a plant for the purpose of inspecting some boilers. After I had finished my work, I was standing talking to the engineer who was telling me about a very serious accident that had occurred in a carpenter shop just across the street. The accident had happened to a man on a jointer. I suggested to my friend that we go over and possibly I could offer some suggestion that might help them, as he had told me that it was the third accident that had occurred on that jointer. We went over, and from all the evidence I could gather the owner of the shop had spared no pains in doing everything possible to put his shop in a safe condition. He had installed a round head on the jointer in place of a square one which had taken a man's hand off. The round head gave a man a severe cut on the hand. Then the owner installed an iron guard over the head of the machine. This guard did not answer the purpose as different kinds of work were done on the jointer that necessitated the removal of the guard. The son of the owner of the shop was doing a piece of work and had the guard removed when he overbalanced, fell forward and stuck his right hand into the knives of the jointer. Before he could recover his balance he had lost three fingers from his hand. It was a pitiful sight to see and hear the owner of that shop talk. The man was standing almost with outstretched hands pleading for assistance. When I told him my occupation he welcomed me into his shop and begged that I give him some idea of installing a guard to make the machine harmless. It had cut off his son's hand and he would do *anything* to put it right.

I felt I had found some material to promote safety and I did not fail to make use of it. I am enclosing a cut of a guard that I consider comes nearer to completely guarding a jointer than any one I have ever seen. It is the one I suggested to this man, and when I left him he was working on it. It is a homemade affair but it does the work. So we can see from this instance that safety is growing, or at least should grow. In recent years we generally consider a round head jointer a safety machine, but this accident goes to show that they are not entirely safe and there is plenty of room for improvement on this type of machine. It also goes to show that safety is still in a crude state and will not be perfected for many years to come. I feel that there is just as much chance, if not more, for the safety engineer to

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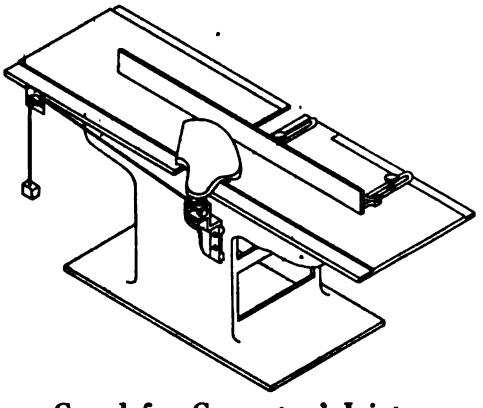

Guard for Carpenters' Jointer

increase his knowledge of safety work as there is for a physician to broaden his knowledge of surgery and the practice of medicine. In considering safety we should not pass it off as a matter of form, but should consider it from every angle, making a deep study of this great work.

Some persons claim that the safety of the plant lies with the foreman; others say it is with the owner of the plant; some say with the employes and some with the inspector. I agree that all of these men have something to do with it but it does not lie entirely with any one person and the condition of the plant cannot be laid at any one's feet, but should rest with every one. It is no more one's duty to practice safety than another's, and it is not a matter that should have to be driven into the minds of men. All men should be eager to learn something or everything about safety. It is a thing that is needed by all mankind from the cradle to the grave. This no one can deny.

Safety, like any other movement, needs heads to properly promote it. As the superintendent and foremen are the heads of plants they also should be heads of the safety work as they can demand attention when other employes can not.

In conclusion the writer would like to say that a foreman who advocates and practices safety, believes in the posting of safety bulletins and makes safety talks to the men under him; one who can get the co-operation of his men in "Safety First" is the man who can do more than any one else in the development of the safety idea.

No. 263 ALL INDUSTRIES — CO-OPERATION.—The writer feels certain that most people conversant with the "Safety First" movement will agree with him when he says that you must "start at the top and work down" to accomplish satisfactory results. I mean by this that to start a safety campaign in any plant, mill, or mines, the first step to be taken, and without doubt, one of the most important, is to make sure the "boss"—the man in charge of the works—is back of the movement, heart and soul. Without his full and earnest support it means opposition all along the line, but with it, you have the key which opens the way to organization and co-operation, the real foundation for accident prevention. If the superintendent or manager shows only a half-hearted interest in the movement you will see his attitude reflected in most of the men under him and the same is true if he shows he means business. When he says: "He wants everything possible done to prevent accidents in his plant," you will immediately notice his attitude reflected in all departments of that plant and the foundation is laid for the detail and routine work of preventing accidents.

Immediately a plant general safety committee should be appointed, preferably from the heads of departments or their assistants, each member of the committee should have his department committee, in large plants sub-department sub-committees composed of workmen and sub-foreman. All committees should meet regularly once or twice a month and discuss freely and openly all things that have come to their notice, pertaining to safety, welfare, sanitation, and in general, safe and sane working conditions.

The sub-committees should submit all important details of their meetings to the general committee of the plant and matters of great importance can be taken up by the general committee with the plant manager for final decision. In this way an aisle is kept open between the man with the pick and shovel and the plant manager; a point not to be ignored.

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A safety engineer or safety inspector, as he may be called, is essential nowadays in all plants employing 300 men or more. He covers the plant constantly, with ears and eyes open; he meets with all committees, investigates all accidents, and is continually giving his ideas and efforts to safeguard the workmen. He is a very important factor.

Many speak of educating The Man On The Job as the biggest factor in accident prevention work. I don't say that it isn't, but I do feel sometimes that it is not so much telling him what he doesn't know as it is persuading him to do what he already knows, and doesn't do because he is careless or has formed habits which are naturally hard to break. Perhaps educating the workmen to do that which he knows he should do is a better way of expressing this most important factor of accident prevention work. If you can make him realize that doing his work the safe way, reporting all unsafe conditions, looking out for his fellow workmen as well as himself, is the true "Safety First" spirit and means future happiness to all concerned, you have won a big point, and right there is where the plant management can do wonders by co-operating, showing that it is anxious to help by safeguarding all dangerous machinery, making working conditions as pleasant as possible and showing in every way that they are always willing to do their share to protect life and limb.

In short, accident prevention work is not a one-man job, but demands the earnest co-operation of all concerned.

Prizes for December Articles

First Prize. No. 258. Walter I. Sweet, Mechanical Expert on Accident Prevention, New York City.

Second Prize. No. 255. J. W. Kamper, Safety Inspector, American Locomotive Company, Schenectady, N. Y.

Honorable Mention. No. 256. M. E. Arkills, Safety Engineer, The Pullman Company, Pullman, Ill.

Other meritorious articles were contributed by W. F. O'Brien, Safety Engineer, Pennsylvania Manufacturers' Association Casualty Insurance Company, Philadelphia, Pa.; Luther D. Burlingame, Industrial Superintendent, Brown & Sharpe Manufacturing Company, Providence, R. I.

Comments by Members of the Committee

I think 255 is entitled to first prize as it outlines one of the best safety campaigns it has ever been my pleasure to read. If followed, in a plant of any size, it would be sure to bring results.

No. 258 is handled as if the writer knew what he was writing about.

No. 255 gives one of the best expositions of the publicity side of the "Safety First" campaign (as it should be worked) that has been published recently.

I like 255 because the safety work at our plant is now largely an educational proposition and part of the education must come through bulletins of human interest.

The author of 258 has spoken of ginger, and there is much of it in this article. Furthermore, the suggestion of the nurse, the thought of the home, the spare moments of the husband, the thought of the children (for some day in the near future they are to take our places), are commendable. If safety is taught to them in childhood, it will mean much when they begin their daily toil. If wives and children are interested in the safety movement, the husband will become more interested.

No. 256 strikes the keynote of success in safety work in the statement that peace of mind is the means of bringing about good results, by producing harmony.

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The writer of 258 speaks as though he knew conditions as they exist and tells how to overcome them. The main thing is to educate the men, which is a hard job.

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No. 256 is all meat. It does not allow of back talk.

No. 258 presents ideals—employers to bring about safe conditions and employes to work under safe conditions. As safety men, we must not be dreamers; we must have visions of better things and strive continually to make them realities. The last paragraph of 258 embodies all necessary instructions.

Educating Workmen in Safety

Editor, SAFETY ENGINEERING.—Something over a year ago copies of SAFETY ENGINEERING were supplied to all of our district superintendents and their foremen in order that they might select the best article under the heading of "The Man On The Job" and vote for it, and when I visited each station for discussion of prevention of accidents, they would be able to discuss the various articles. So much advantage was obtained from this that I was very much gratified, but something seemed lacking. The discussion on this topic excluded the linemen, ground hands, operators, construction men and others who attended these meetings. That did not seem quite fair, so, desiring to obtain reprints of "The Man On The Job," so that all of the men could take part in the discussions, I put it to a vote to see if the men wanted them, would read them, return them with their names, the number of the article selected and their reasons for the selection. I had five stations to visit, all of which I cover once a month. After I had made the complete rounds and found the vote favorable, I had the reprints on hand, for, after the first vote, I had decided it would go through.

The first time around was a failure. I received but few returns from each station. The reason given when I asked each man was that he either lost his copy, forgot, or did not have time. In the second month, there had been some mistake, and the men did not get them in time; that was only at one station. I felt somewhat discouraged, but at the next station every man had voted, and most of them had given a reason on his selection of the best article. I made the mistake of trying to read the reasons aloud myself, taking a good deal of time, so when I went to the next station, I handed each man his own reasons, and asked him to read them when called upon. I found the discussion among the foremen particularly interesting, and when I called on the others, instead of reading their reasons, they stood up and gave them. The benefit can be seen at once. I have cultivated discussion all along, but this helps amazingly. At the other stations, I met with varying success. The October number, being ahead of time, upset the order of the third attempt. The men had it so long that many had lost their copies, but on the third trial, I made an appeal to the men, and they all held up their hands, signifying a willingness to help this good work. It is for the good of all of us, and even if I received only a few at each station, I would feel that it was a success. And when I think of the station where all responded, I feel encouraged and say, "Let the good work go on."

My last meeting was the most enthusiastic that I have had through the use of "The Man On The Job" pamphlet. Fifty-two men out of 100 had their reasons for their selections of their favorite article. The first man was embarrassed and would not get up and talk. Therefore, I walked over in a friendly manner and held him by the arm and told him to talk so all in the room could hear. That gave him confidence and, when he got started, he made quite a talk, which was applauded.

W. P. STRICKLAND,
General Inspector, New York & Queens
Electric Light & Power Company.
Long Island City, November 28, 1916.

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The Fight Against Fire

Conservation of Life and Property by Safe Construction, Fire Prevention Methods and Fire Protection

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles, Suggestions, etc., relating to Safe Construction, Fire Prevention and Fire Extinguishment. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 116 THE VALUE OF A FIRE WALL.—The value of a fire wall under trying circumstances cannot be over-estimated. To the layman this wall under normal conditions appears to be unnecessary, becomes an eyesore and a hindrance in his daily work. Only a man not familiar with the rapid manner in which fire will travel and spread ruin, will think along these lines.

Imagine the relief of an officer in command, upon arriving at a building with large open area and fire extending throughout unchecked, with similar structures containing inflammable materials adjoining in the path of the advancing fire, to find a fire wall separating the building on fire from the adjoining premises. Only a fireman who has been placed in this position can realize what a great factor this wall will be in extinguishing the fire. He knows the fire wall will act as a more efficient barrier to control the fire with less damage than all the equipment and water supply at his command, and he can feel positive that the fire will not become unmanageable.

Architects and builders should take into careful consideration the importance of a fire wall in buildings covering large areas. This is especially true of frame buildings in the outlying districts with big, open areas, generally termed by firemen as "built to burn."

Fire walls not only act as a check to spread of fire, but also prevent serious explosions at times by keeping the fire and heat from extending to parts isolated by the fire wall, where hazardous materials may be stored or manufactured, thereby eliminating great confusion, with its attendant loss of life and property.

An 8-inch brick wall, to the writer's knowledge, has prevented the spread of a fire in a plant used for the manufacture of artificial ice, from the engine and boiler rooms where the fire originated, to that portion of a large frame building where the tanks and pipes containing ammonia were located. This plant was without means of relieving pressure on ammonia tanks in emergency cases. Had the fire or heat extended to this part of plant (thanks to the brick wall it did not) the officer in command of the fire would have had a different problem to solve. In this instance the fire was controlled with a one-alarm assignment. If the fire wall had been omitted the sending of a third or fourth alarm would have been necessary, with probably a special call for three or more ambulances.

In short, fire walls confine fires to a limited area and eliminate the chances of a conflagration, allow best results from sprinkler systems and a lower fire insurance rate, furnish more efficient fire protection and, best of all, give a feeling of security from an extensive fire and its serious after effects.

Fire walls are most valuable and effective in separating large areas or buildings when constructed of brick of proper thickness with automatic fire doors on each side of wall. All other openings should be fire-stopped and built up from the foundation independently, to a safe distance above the roof of structures.

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No. 117 SAFETY FIRST ELECTRICALLY.—From the standpoint of safety, the inspection of electrical wiring and apparatus is just as necessary as the use of electricity itself. The mere fact that an inspection is to be made, naturally produces a better grade of work; for while

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the good mechanic takes pride in his work and feels a certain moral responsibility for the safety of installations made by him, the poor mechanic will do his work as well as he does because he has to.

Many people have the mistaken idea that, so long as their lights will burn, their wiring must be all right, and this often leads to hazardous conditions. The writer was once called to inspect some wiring where sparks were seen between a gas pipe and a pipe belonging to the heating system. Upon investigation it was found that when the fuse on what happened to be the basement circuit was blown, a penny was placed under the fuse plug, and the gas pipe, where it crossed the heat pipe, was eaten about two-thirds of the way through. Had this sparking continued until a hole had been eaten or burned entirely through the gas pipe, it can readily be seen that the whole basement might have been one mass of flame before it was discovered. Yet it was hard to convince the owner that he ought not to let irresponsible persons tamper with his wiring. He insisted that the lights installed by them burned just as well as those put in by a regular electrician. Evidently his motto was Economy First, even though it be *false* economy, rather than "Safety First."

Many cities provide for a rigid inspection of all installations before the current is connected, but what of the many premises where electricity is already in use, where there has been a light added in one place or a switch in another, by anyone who can make a light burn? It is surprising to learn how many people will have a little wiring done, have it inspected and the current connected, than have considerably more wiring done, apparently for no other reason than to evade inspection, even where the inspection fee is the same for all the light openings as for that part which was inspected. Are we going to make "Safety First" a meaningless term by not providing for re-inspection? We never find poorly made joints, telephone wire or drop cord substituted for regular approved rubber covered wire, neither do we find overfusing, coins, jumpers or other hazardous substitutes for fuses on new work that is to be inspected. Yet these same conditions can often be found as soon as six months after the original installation.

Re-inspection should be the watchword and is in every way a "Safety First" movement. It is applicable not only to public buildings but to private homes as well. If the wiring is of enough importance to exercise "Safety First" by inspection of new work, why not make it SAFETY FIRST, LAST and ALL THE TIME, and provide for more rigid re-inspection. When additional lights are to be installed or changes made we owe it to ourselves and our neighbors, in the interest of public safety and fire prevention, to have some responsible electrician do our work.

Electricity properly installed and maintained is the safest method of light and power. Improperly maintained it is the most treacherous.

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No. 118 WHY FIRE PREVENTION HAS COME TO STAY.—A study of fire insurance and fire department records will show that about 10 per cent of all fires are of incendiary origin; about 80 per cent originate from carelessness, in many cases criminally so, such as careless accumulations of rubbish, the storage and handling of explosives, combustible oils, matches, smoking, defective flues and other causes easily controlled.

Experts say that 80 per cent of our fires are preventable and more than 30 States in the Union have laws which authorize and require the fire marshal, or fire commissioner and his deputies, to make inspections and cause the removal of hazardous conditions, especially where such conditions endanger other property or persons. Notwithstanding this the fire loss of the United States is annually about $250,000,000. This does not include mine, marine and forest fires.

In 1907 the Federal government, through our consulates, began an investigation of fire conditions in Europe. They found in every case that our fire department and fire fighting methods are vastly superior in comparison, but our fire losses are much larger than those of European countries.

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In 1910 Germany, with a combined population of 5,618,822 in 13 cities, suffered a fire loss of $1,067,205. Fires in 5 American cities, Chicago, Philadelphia, Boston, St. Louis and Baltimore, with a combined population of 5,510,897 suffered a fire loss in the same year of $14,250,183. New York City with a population of 4,766,883 added to this loss in the same year, $8,591,831.

This is not the worst loss we have suffered. Figures compiled by the U. S. Geological Survey show that in the year 1912 fires caused 4,347 deaths and 16,962 injured persons. The buildings consumed in one year would line both sides of a street from New York to Chicago, and a person walking along this street would pass every few minutes a dead or injured person. Since 1903 three fires alone—the Collinwood school house, the steamer *General Slocum* and the Asch building (Triangle factory) fire made a total of more than 2,000 deaths.

Those who are in a position to know place the blame upon the criminally lax fire laws and the bad condition of our old buildings.

There is the same unanimity as to the remedy. In place of fire fighting, heroic and efficient, and the waste of our energies and resources after the fire has been started, we need the quiet, determined, effective methods of fire prevention.

Ex-Chief Croker, in making a summary of our enormous fire loss, said the City of New York spends $8,000,000 per annum for the maintenance of her fire department, and but $200,000 per annum for fire prevention, and that is the reason for most of our losses. New York City has more than 5,000 firemen while London has but 1,500.

Health departments do not wait for a scourge of disease to develop, and what disease causes so much horror and suffering as the fire fiend? We have the prevention medicine for fire, and the same logic which has compelled governments, through their boards of health, to practice one sort of prevention must in time bring them to take up the practice of the other. Many States and municipalities have taken up this subject, and our Federal government must in time follow their lead. Conservation of the nation's resources, if nothing else, must in time force such action.

The average business man locks his valuable papers in a fireproof vault and many times places his family in a wooden tinder box for a home. It is therefore necessary that provision by law be made to compel the removal of unnecessary hazardous conditions for humanity's sake if not for the sake of conservation. Statistics show that there are about 15.-000,000 buildings in the United States. These cannot all be torn down and rebuilt but valuable results can be achieved by laws requiring safe chimney flues, fire doors and shutters. In fact any measure should be adopted that will eliminate exposures and confine a fire to the building in which it starts.

For the same reason that our laws prohibit an owner from allowing a dangerous animal to run at large and hold him criminally liable for damage by vehicles, engines, trains or automobiles, so should the law prohibit him from maintaining hazardous conditions on his premises which, in the event of fire, would become a menace to life and, in many cases, to the property values of an entire city or town.

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No. 119 SPONTANEOUS COMBUSTION OR IGNITION. — Under the heading of spontaneous ignition are generally classed all cases of quick or slow oxidation, or combustion brought about by various processes without the active agency of heat. Many instances of spontaneous ignition are preceded by spontaneous heating; others occur suddenly, even explosively, without this preliminary, so they might be termed cases of spontaneous explosion. These latter, which one might term acute cases, are not of a more dangerous character than those preceded by gradual spontaneous heating, and might on that account be classed as chronic. One can never be sure of substances liable to chronic spontaneous ignition; they may be stored for years, worked up, packed and shipped without manifesting any sign of their dangerous character, until at some time it is found the mass has become intensely carbonized or entirely

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consumed. It is in this behavior that the greatest danger lies.

The most earnest attention should be devoted to the study of the process of spontaneous heating, which at any time, at any of the works and terminals, may develop into spontaneous ignition. This process is well illustrated by the following experiments which have been carried out at a plant of my company.

Very often fires occur which are traceable to the spontaneous ignition of oil-soaked waste, cloth or paper. The explanation of this is that drying oils, the most common of which is linseed oil, have the property of absorbing oxygen from the air, thereby generating heat. When the oil is spread out over the fibers of waste or cloth there may be a sufficient rise in temperature to reach the ignition point—dangerous fires resulting. Leaving oil-soaked material in heated and poorly ventilated places makes conditions favorable for fires of this nature.

A 5-gallon can, which had a hole in the side to insert waste, was used to carry out the tests shown below. A thermometer was suspended from the top of the can into a ball of oily cotton waste, in the center of which was placed the oil. For each experiment the chamber was kept at approximately 120° Fahrenheit.

TRIAL WITH BOILED LINSEED OIL

Amount of oil	¼ Pint
Cotton waste	¼ Pound
Temperature of chamber	122° F.
Temperature of oil at start	82° F.

RESULTS

Hours		Temperature
½		102° Fahr.
1		162° Fahr.
1½	Smoking	341° Fahr.
2	Perfect ignition	580° Fahr.

TRIAL WITH LINSEED OIL AND TURPENTINE, EQUAL PARTS

Boiled linseed oil	⅛ Pint
Turpentine	⅛ Pint
Cotton waste	¼ Pound
Temperature of chamber	119° Fahr.
Temperature of oil at start	84° Fahr.

RESULTS

Hours		Temperature
½		94° Fahr.
1		140° Fahr.
1½	Smoking	360° Fahr.
2	Perfect ignition	640° Fahr.

TRIAL WITH GRAPHITE PAINT

Amount of graphite paint	4 Oz.
Cotton waste	¼ Pound
Temperature chamber at start	117° F.
Temperature oil at start	82° F.

RESULTS

Hours	Temperature
½	92° Fahr.
1	164° Fahr.
1½	240° Fahr.
2	260° Fahr.
2½	272° Fahr.
3	266° Fahr.
3½	254° Fahr.

There was no ignition in this case, the temperature falling after 2½ hours.

The above tests illustrate how a careless employe might throw a piece of linseed oil-soaked waste upon a radiator, steam line, or in some out-of-the-way place, and cause a great loss to his company. If waste in this condition cannot be disposed of at once, keeping it in a metal receptacle would greatly reduce the probabilities of fire from such a source.

Electrical behavior of gasoline merits special attention — electricity being in most instances the real cause of fires ascribed to spontaneous ignition of gasoline. As a matter of fact, gasoline is not a spontaneous inflammable in a chemical sense, but its vapors when mixed with air may be exploded by an electric spark. In connection with this is the dangerous practice of employes washing overalls or other articles of clothing in gasoline. This is certainly one of the most dangerous things one can do. At a refinery where the writer was employed, a still man was seriously burned while washing his coat in gasoline—the flesh of his hands and face being burned to the bone. This accident can be attributed to several causes: Fragments, such as buttons or other metallic substance, coming in contact with the metal

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receptacle which contained the gasoline; friction, caused by rubbing cloth together, this operation conducting the electricity from the body—it is a well-known fact that some persons are heavily charged with electricity.

Soot, linen, paper, cotton, or woolen stuffs, when soaked with a relatively small percentage of oil and exposed to a limited amount of air take fire readily. The only safe rule to follow, the safety committee points out, is to keep all work shops scrupulously clean and refuse to permit rubbish or waste materials to accumulate, especially in out-of-the-way places. Every day should be a Clean-Up and Fire-Prevention Day in every manufacturing plant in the United States.

Safety Commandments for Paper Mills

Safety Bulletin, Marathon Paper Mills Company.

1. Thou shalt have no thoughts other than those of thy work.
2. Thou shalt take no unnecessary risks nor try to show off nor play practical jokes, for by thy carelessness thou mayest do injury which will affect unto the third or fourth generations.
3. Thou shalt not swear nor lose thy temper when things do not come just right.
4. Remember that thou art not the only one on the job, and that other lives are just as important as thine own.
5. Honor thy job as thyself, that thy days may be long in employment.
6. Thou shalt not clean machinery while it is in motion.
7. Thou shalt not watch thy neighbor's work, but attend to thine own.
8. Thou shalt not let the sleeves of thy shirt hang loose nor leave the flaps of thy coat unbuttoned, as they may get caught in the machinery.
9. Thou shalt not throw matches or greasy waste on the floor, nor scatter oil around bearings, as a dirty worker is a clumsy worker and a clumsy worker is a menace to his fellow workers.
10. Thou shalt not interfere with the switches, nor the cables, nor the engines, nor anything else that thou art told is dangerous.

New Safety Signs for New York Central

IN a new "Safety First" campaign, the New York Central railroad has equipped its flagmen at crossings with an oval sign bearing the word "Stop" in large letters. It is the belief of railroad officials that it will tend to lessen accidents at the grade crossings by better warning travelers of the approach of trains.

In a statement the officials have this to say:

"The railroad, however, urges that whether the "Stop" sign is displayed at a crossing or not, travelers on the highways should take no chances. If every person would stop, look and listen, taking but a moment's time to observe that simple precaution, railroad grade crossing accidents would be practically eliminated for all time."

In another part of the statement, it is declared accidents at railroad grade crossings have increased 100 per cent in the last five years and that all railroads are to make a determined effort to lessen them. The new sign for the Central's flagmen is part of this campaign. The statement points out that more than 1,000 persons are killed and twice that many more or less seriously injured at grade crossings.

The safety bureau of the New York Central recently made an investigation which showed that out of 8,000 vehicles which crossed their tracks at three separate crossings during a twelve-hour period, less than 400 of the drivers looked both ways before crossing the tracks.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

THE HOLT CONNECTION

The need of an improved line of roof leader and vent connections has been apparent for some time, arrangements as used in the past being unsatisfactory.

The Holt Connection, with its roof lock fittings and its important expansion joint feature, will prevent leaks around outlets, due to settling of roof deck caused by shrinkage or settlement, or expansion and contraction in the leader lines, and by eliminating sheet metal outlet boxes it does away with the collapsing, condensation and leaks characteristic of that form of outlet. Its series of three gravel stops prevents any loose gravel, leaves or roof rubbish from washing into and clogging the down-spout.

The Holt Connection is made entirely of copper and cast iron, and, therefore, it insures service as lasting as any part of the roof and provides a flexible connection, made possible by an expansion joint fitting. The outlet is also made integral with the roof deck by means of a lock fitting which entirely prevents any strain or movement at the roof line.

The Holt Connection is designed for use for any kind of flat or nearly flat roof construction—gravel, metal, inlaid slate, tile or felt, and for any place where vent pipes, leader lines, steam stacks, flag poles; in fact, any fixtures passing through the roof, require flashing.

This connection is made in different styles, to meet different requirements, by The Barrett Company, 17 Battery Place, New York City. A full description will be sent upon request.

CHANGE IN PYRENE STAFF

William H. Yetman, who for the past six months has been railroad sales manager for the Pyrene Mfg. Company, making his headquarters in Chicago, has been transferred by the company to the Pacific Coast where he will take charge of the company's new division office with headquarters in San Francisco. Ever since the Pyrene Mfg. Company has been in business it has been represented on the Coast by the Gorham Fire Apparatus Company. When it was decided that the company should have a representative of its own on the Coast, Mr. Yetman was chosen for the job.

He will be assisted in his work by Mr. E. McAuliffe, who has been for some years in the Fire Prevention business on the Coast. Mr. McAuliffe will have charge of the company's branch office in Los Angeles. The new sales division will include the whole of California.

FIRE RESISTING PAINT

The Pyrolin Products Company, Inc., Fort Dodge, Iowa, manufactures a paint which has been demonstrated by exhaustive experiments to be able to withstand great heat and prevent the object to which it is applied from catching fire. The U. S. Government experts have given Pyrolin a severe test as follows:

The apparatus used consisted of a chamber made of asbestos board, 22 inches long, 10 inches wide and 7 inches thick. The heat was obtained from two electric heating coils fastened together and placed in the apparatus in such a manner that the heat radiated to the lower part of the test specimen, which was placed three-quarters of an inch distant. A gas pilot light was allowed to burn just below the center of the heating plates. Three Cypress boards were painted with one coat of Pyrolin Factory Interior White, and three with two coats of white lead paint. In the case of the white lead, the first coat was allowed to dry for three days before the second coat was applied. The specimens painted with white lead were allowed to season in the laboratory for approximately 45 days before being tested. The specimens painted with Pyrolin Factory Interior White were tested 24 hours after painting. Sufficient electric current was passed through the heating coil to give the plates a temperature of approximately 325 degrees centigrade. The radiated heat caused a distillation of the wood or the giving off of volatile inflammable gases. To ignite these gases the pilot light was flashed up past the face of the specimens at five second intervals. The length of time necessary to ignite the specimens was determined by means of a stop watch.

The first specimen was allowed to remain in the apparatus exposed to the heat plate for 30 minutes. No ignition occurred during

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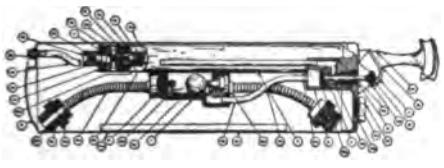
that time and the specimen was not charred through. The second specimen was exposed to the heating plate 40 minutes without igniting, and upon examination was found to be charred through. The third specimen ignited after eight minutes' exposure, burned poorly for 11 minutes when it went out and could not be ignited again.

The average time of exposure to the heating plate before ignition was as follows:

Pyrolin Factory Interior White—26 minutes.
White Lead Oil Paint—2 minutes 40 seconds.
Unpainted Cypress—1 minute 8 seconds.

A very interesting booklet may be had on application to the company.



FYR-FYTER FIRE EXTINGUISHER

The one-quart FYR-FYTER Extinguisher consists of a strongly built cylindrical brass reservoir, a manually operated air pump and a sensitized gravity valve and pick-up mechanism which insures the discharge of the liquid contents in a solid stream, free from entrained air. The pump capacity is so much greater than the liquid discharge that a powerful stream is quickly brought into action and kept shooting, without continuous pumping. This feature, with the easy pumping made possible by the lubricated piston, enables the operator to direct the stream with accuracy.

The pump handle (2) unlocks by a quarter turn in either direction. The shut-off (24) is opened and closed positively by the sealing button (31) attached to the sealing stem (7), traveling up and down in the grooved cam on handle, thus drawing up sealing disc (24) tight against cork disc (5) when handle (2) is in locked position and pushing it away when handle is unlocked.

When handle (2) is pulled out, ball valve (32), which is guided by the light spring (4), is sucked forward by the vacuum formed and air rushes through two holes in piston tube (30) and four holes in side of piston cap (11), filling cylinder (9). When handle (2) is pushed in, the ball valve (32) checks and the spring (38) prevents any possible slippage of pump by keeping "Vim" cup leather (4) fully expanded against wall of pump cylinder. Air is thus compressed and forced into the liquid cylinder through ball valve (39), which is guided and held in place by a somewhat stronger spring than 40. Pump cylinder is further sealed against entrance of liquid by piston seal cap (11) attached to piston body (12) compressing cork sealing washer (3).

The air forced into liquid cylinder naturally collects at the high point, exerting pressure on the same. To pick up and discharge the liquid a die-casted lead gravity valve (1), to which two pieces of flexible metal hose (34) are attached, has been provided. The lead finders (19), attached to flexible tubes (34), cause the tubes to drop to the lowest point in the cylinder, and are cushioned, to prevent rattling, by two felt washers (20 and 21). These tubes (34) are soldered to gravity valve casting (1) by means of brass finder bases (26). When extinguisher is pointed down two degrees or more, lead ball (18) rolls on edge of top of groove in which sled (25) slides on two narrow tracks raised above the floor of the groove, hitting bottom valve (17) and pushing it downward, thus opening same. As both valves are hitched together by means of the sled (25), the upper valve is pulled shut, preventing entrance of air. The liquid is forced by air pressure through lower folder (19), flexible tube (34) and lower valve (17) into centre chamber of die-casting (1) and out through by-pass tube (35), shut-off valve discharge tube (33) and nozzle (22). When machine is pointed upward, liquid passes through opposite finder, tube and valve. When shut-off valve (24) is closed, pressure is against head of valve, so no pressure is exerted against packing (23); thus possible leakage at this point is prevented. Machine is filled, or air pressure may be released by unscrewing filler cap (27), which is provided with a lead gasket (28).

Denting the shell will not injure pick-up mechanism, because the flexible tubes flop about instead of revolving in a defined course close to the shell. A dent in the bottom cup of shell will not affect lower flexible tube, as a sufficient clearance has been allowed to prevent any possibility of wedging.

Extinguishers are filled with FYR-FYTER Fluid, a specially prepared liquid, having carbon tetrachloride (CCL4) as a base, to which has been added non-injurious chemicals to preserve and depress freezing point.

The liquid will not deteriorate with age or damage delicate fabrics, metals or finishes. It is an absolute non-conductor of electricity, by reason of which it is adapted for extinguishing electrical short circuits or other fires around electrical machinery. It is miscible with oils and gasoline and furnishes a means of extinguishing these highly inflammable materials, because in the presence of heat it is converted into a heavy gas, which blankets the fire and smothers it by cutting off the oxygen. FYR-FYTER Extinguishers can be readily refilled by unscrewing filler cap and pouring in FYR-FYTER Fluid, the same as you would fill a lamp or bottle. FYR-FYTER Fluid is put up in quart and gallon cans. Additional information can be obtained by writing The Fyr-Fyter Co., Dayton, Ohio.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

AMERICAN SPECIFICATION ROOF COVERINGS WITH GRAVEL OR CRUSHED SLAG. American Tar Products Company, Mfr., 208 S. La Salle Street, Chicago, Ill.

AUTOMATIC SPRINKLER, Crowder, Issue A. Crowder Bros., Mfrs., 309 Laclede Bldg., St. Louis, Mo. Ordinary (uncolored), Intermediate (colored White), Hard (colored Blue), Extra Hard (colored red); all for use under ordinary conditions.

AUTOMATIC SPRINKLER, Esty, Issue B. Esty Sprinkler Co., Mfr., Laconia, N. H. H. G. Vogel, Sole Agents, New York, N. Y.

AUTOMATIC SPRINKLER, Globe Issue C. Globe Automatic Sprinkler Co., Mfr., 2019 Washington Avenue, Philadelphia, Pa.

AUTOMATIC SPRINKLER, "Grinnell, Improved 1903." Canadian General Fire Extinguisher Co., Ltd., Mfr., 1200 Dundas Street, Toronto, Ont.

AUTOMATIC SPRINKLER, Independent Issue "A." Independent Sprinkler Co., Mfr., 2314 N. 9th Street, Philadelphia, Pa.

AUTOMATIC SPRINKLER, International Issue B. International Sprinkler Co., Mfr., 123 William Street, New York City.

AUTOMATIC SPRINKLER, Lapham, Issue B. Ohio Automatic Sprinkler Co., Mfr., Youngstown, Ohio.

AUTOMATIC SPRINKLER, Manufacturers, Issue C. Automatic Sprinkler Co. of America, Mfr., 123 William Street, New York.

AUTOMATIC SPRINKLER, Rockwood Issue D. Rockwood Sprinkler Co., Mfr., 38 Harlow Street, Worcester, Mass.

CELLULOIDED GLASS.. Super-Glass Co., The, Mfr., Tacony, Philadelphia, Pa., Super-Glass, material composed of alternate laminations of plate glass and celluloid welded together. Ordinary product has one sheet of celluloid between two pieces of plate glass.

CENTRIFUGAL FIRE PUMP, NATIONAL STANDARD TYPE. Earle Gear & Machine Co.,. Mfr., Philadelphia, Pa.

CHEMICAL EXTINGUISHER, 1½ Gals., Loose Stopple Type. American-LaFrance Fire Engine Co., Mfr., Elmira, N. Y.

CLASS C, SHINGLE ROOF COVERINGS. Asphalt Ready Roofing Co., Mfr., 9 Church Street, New York, N. Y.

CLASS C, SHINGLE ROOF COVERINGS. Johns-Manville Co., H. W., Mfr., Madison Avenue and 41st Street, New York, N. Y.

CLASS C, SHINGLE ROOF COVERINGS. National Roofing Co., Mfr., Tonawanda, N. Y.

ENCLOSED SWITCHES. Detroit Fuse & Mfg. Co., Mfr., 1400 Rivard Street, Detroit, Mich. Two or 3 pole, double break, spring actuated, plunger type switches and cutout bases for standard cartridge enclosed fuses.

EBSARY GYPSUM BLOCKS. Ebsary Fireproofing & Gypsum Block Co., Mfr., 140 W. 42nd Street, New York City. Factories at Garbutt, N. Y., Caledonia, Ont.

FRAMES (Double Type). McFarland-Hyde Co., Mfr., 28th Place and Fifth Avenue, Chicago, Ill.

FRAMES (Double Type). Voigtmann & Co., Mfr., 445-459 W. Erie Street, Chicago, Ill.

FRAMES (Double Type). Wagner's Sons, J. F., Mfr., 1147 Seventh Street, Louisville, Ky.

GASOLENE HOSE "Regulation B." Atlantic Metal Hose Co., Inc., Mfr., 1777 Broadway, New York, N. Y.

GASOLENE HOSE "Western." Goodrich Company, The B. F., Mfr., Akron, Ohio.

HARDWARE—Swinging Pattern. Aurora Door Hanger & Specialty Co., Mfr., Aurora, Ill. Hardware for swinging, tin-clad fire doors and shutters mounted singly and in pairs.

HARDWARE—Swinging Pattern. St. Louis Fire Door Co., Mfr., 15th and Clark Avenue, St. Louis, Mo. Hardware for swinging, tin-clad fire doors and shutters mounted singly and in pairs.

PINNACLE ACETYLENE GENERATOR. Oxweld Acetylene Co., Mfr., 36th Street and Jasper Place, Chicago, Ill. Stationary automatic apparatus of carbide-to-water type. Designed for illuminating purposes.

PORTABLE FIRE ESCAPES. Jersild Fire Escape Co., Mfr., Neenah, Wis. Types A and B devices consist of small jib-cranes swung on supporting brackets on window frame and provided with a steel cable, rubber-tube-covered near end to form loop around body of user. Type C device consists of frame with supporting hook and provided with grease-filled retarding cylinders, drum and cable as in Type A device.

SLIDING OR SWINGING SHEET METAL FIRE WALL DOOR. American Sheet Metal Works, Mfr., Carrollton Avenue and Edinburgh Street, New Orleans, La. Door made of two sheets of vertically corrugated galvanized sheet steel stiffened by a surrounding frame of tubular members of galvanized sheet steel. Thin sheet of asbestos between faces of door.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Alliance Fireproof Door Co., Mfr., 245 Java Street, Brooklyn, N. Y.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Metal Shingle & Sliding Co., Ltd., The, Mfr., St. Catherine Street and Delorimier Avenue, Montreal, Que.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Warnke Bros. Co., The, Mfr., 27 Erie Street, Toledo, Ohio.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Cincinnati Mfg. Co., The, Mfr., Gest and Evans Streets, Cincinnati, Ohio.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Weiss, M. L., Inc., Mfr., 6 E. 12th Street, New York, N. Y. Three-ply, tin-clad, designed for protection of openings in fire walls.

SWEEPING COMPOUND, Commercial. National Chemical Co., Mfr., Dallas, Tex. The product consists of sand, sawdust, red paint pigment, naphthaline flakes, and a heavy mineral oil. For use as a dust carrier in sweeping floors.

SIGNALS. Miscellaneous. American Telephone Fire Alarm Co., Mfr., Chicago, Ill., "Denio" Telephone Fire Alarm. For use on telephone systems having either manual or automatic exchanges.

SWINGING, HOLLOW METAL FIRE WALL DOOR. Empire Art Metal Co., Inc., The, Mfr., College Point, N. Y. Door made of black sheet steel. Stiles and rails of hollow construction lined with asbestos. Panel 1 in. thick and filled with asbestos.

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SAFETY ENGINEERING

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SAVING THE LIVES AND LIMBS OF WORKMEN

Editorial Note: The opinions of prominent men, large employers of labor and authorities in the world of industry, on the importance of Industrial Accident Prevention Work, have been requested by "Safety Engineering"

"An Accident Is an Inefficiency"

By Clarence H. Howard

President, Commonwealth Steel Company

IN the Commonwealth Steel Company we regard safety work as one of the most constructive values that has ever come to our company. Being the study of the right way to do things, safety work has been a great efficiency benefit in our shop.

Safety is Fellowship! "Safety First" is humanizing industry! Workmen and management getting together on terms of mutual helpfulness and respect to work out how the employes can be safeguarded and the sorrow and pain and loss by industrial accidents avoided, has greatly helped the feeling of good-will in the shop—which has meant better team work and better co-operation for all conditions.

An accident is an inefficiency and is now so regarded in our shop. Besides these constructive benefits of greater efficiency and good feeling we have effected a large financial saving through accident prevention. These savings we have not used for the benefit of the stockholders but for the furthering of fellowship work, such as sending our boys to school on company time, an employes' commissary, a plant periodical, fellowship club, etc.

We would never think of going back to the dark-age period existing before the "Safety First" uplift, with its *"No-accidents"* and good feeling, came to our company.

I attach my definition of fellowship:

Fellowship.—Fellowship is a comprehensive vital force, always finding expression in the Golden Rule. It broadens our view, increases our abilities, enriches and purifies character. Its chief foundation-stone is co-operation. By its very nature it is unselfish. Therefore it cannot exist alone, but requires all mankind to share it. Fellowship has no elements of failure, no racial or other prejudices, no hate, envy, jealousy or who-shall-be-greatest. Therefore, it must aid in ending strikes and wars. True Fellowship, understood and practiced, establishes the brotherhood of man, which is "On earth peace, goodwill toward men."

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"A Careful Workman Is a Distinct Asset"

By Andrew Fletcher

President, American Locomotive Company

I AM glad to go on record as being heartily in favor of all practicable plans having in view the prevention of accidents. There is little room in industry now for slipshod practices or slipshod men, and I look upon the conservation of life and limb as one of the most important problems with which industry has to deal. Aside from the direct advantages to a workman and his family that are insured by habits of carefulness and safe surroundings, a careful workman is a distinct asset to the company. There is as great a need in industry for men who have the safety habit as there is for effective safety appliances and methods, and recognizing as we do the importance of maintaining the physical equipment of a plant at the highest state of efficiency, no apology need be made for endeavoring in every practicable way to prevent men from being injured while at work. Any plan of organization or of education that serves this end has my full approval.

"The Doctrines of Carefulness and Safety"

By A. H. Smith

President, New York Central Lines

I BELIEVE a continuous and systematic effort, made along educational lines, to arouse and sustain a spirit of co-operation in accident prevention among all classes of employes, is essential in transportation and industrial enterprises today. Accident prevention should be made a subject for specialization as it is one of the important problems of such enterprises, and requires intelligent and constant attention. The doctrines of Carefulness and Safety need to be continually and effectively brought home to every individual, and experience has proven to us that properly organized work in this direction is productive of gratifying results in life conservation.

"Selection of Workmen Is the Stepping Stone"

By F. A. Keys

Oneida Steel Pulley Company

IT IS our opinion that a very careful selection of workmen is the stepping stone in the matter, judging as to habits and physical condition. The next step is to make a very careful inspection of tools and methods of operation at regular intervals by competent and conscientious men. Every plant should have a first aid equipment to render first aid treatment to injured workmen. The next step is some class of insurance to provide for workmen in case of sickness, the compensation makes provision in case of accident. Where a man is not protected by some insurance he invariably calls upon his fellow workmen to assist him and is, therefore, dependent upon others.

These methods are practiced in our plant and we have just passed through a very successful, we might say fortunate, year, in the matter of injuries occurring in the plant. In fact we are proud of the past year's record.

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"Emergencies Arise When Self Must Be Forgotten"

By S. T. Bodine

President, The United Gas Improvement Company

NO WORKMEN'S compensation act can compensate an honest, thrifty workman and his family—no accident insurance can compensate an employer, for the burden in the home of a disabled worker or the presence in the shop or on the street of a new hand substituted for one trained and efficient. Emergencies may arise when self must be forgotten in the effort to save life or property, but such emergencies may be made well nigh impossible by employers and employes adopting and living up to the slogan: *"Be Careful First."*

"Much Can Be Done by Avoiding Unsafe Practices"

By R. H. Aishton

President, Chicago & North Western Railway Company

WE ARE heartily in favor of everything that will promote the "Safety First" idea. This company was one of the first railroads to campaign actively on "Safety First" and we are well pleased with the results attained. I know of nothing that should arouse more interest than the preservation of life and limb—and especially when so much can be done by avoiding unsafe practices.

"Each Man Must Also Be His Brother's Keeper"

By F. W. Fisher

Safety Engineer, Rochester Railway & Light Company

A COPY of a poster issued by James T. Hutchings, general manager of this company, several years ago, expresses very clearly this company's attitude. This company has for years made accident prevention work a regular operating feature:

WE WANT YOUR HELP FOR GREATER SAFETY.—From time to time this company, through department heads and foremen, has drawn the attention of employes to suggestions and regulations for the *prevention of accidents.* It has been continually brought to our notice that the majority of accidents occur to us all as a result of carelessness, forgetfulness, or negligence on our own part.

The management requests all employes to be as exact and faithful in obeying regulations for their safety as they are in the performance of their regular duties.

It is impossible for *your company* to prevent accidents unless it receives the personal help of each employe. Each employe should, therefore, remember that his safety depends upon his co-operation with the company's efforts to prevent accidents.

The careless workman imperils not only his own safety but that of the man who works next to him. Therefore, each man must care not only for his own safety but must also be his brother's keeper.

Accidents happen at the unexpected moment, and they are a terrible price paid for carelessness, forgetfulness, or negligence. The fact that 90 out of every 100 accidents are caused by some one's carelessness, forgetfulness, or negligence should make each of us take pride in keeping from getting hurt, and feel that WE do not want to be the clumsy or careless ones.

I want to feel that our company is in the lead in this as in other lines of work; that we have the best company; that we furnish the best service; *and that we have the most careful men of any company in the United States,* and if each of you will personally help we can have all this.

We hope and expect that all men working with us will give prompt co-operation to *safety suggestions and regulations or other advice* which may be placed before them on behalf of GREATER SAFETY.

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Maintaining Interest in Accident Prevention

General Round Table Discussion at the Fifth Annual Congress of the National Safety Council

H. W. Forster, Chairman

Chief Engineer, Independence Inspection Bureau

CHAIRMAN FORSTER: The National Safety Council originated at a Round Table, and ever since that time one of the most important features of our annual Congresses, and one of the big features of all of our local activities, has been a Round Table. It is very fitting and proper that we should today, at our only general session during this Congress outside of our business meeting, devote the time to a Round Table.

The problem which has confronted every single man who has organized his plant for safety, and a comparatively short time after he has had his organization perfected, was how to maintain interest in safety. I think it is desirable, even before we undertake a safety organization, or safety movement, that we figure out with considerable care how we are to maintain interest in the work after we get it going. You know that inelegant expression: "Don't start anything you can't finish."

Many safety movements have been doomed almost to failure. When safety committeemen started work it took considerable time to really get on their feet, because all their knowledge and all their interest was expended in one great big toot at the beginning. They have given all their knowledge, almost all their enthusiasm, and, perhaps, almost all their money, and put it in the opening performance. There was nothing to back that proposition up. This meeting today is to be devoted to ideas as to how to keep the ball rolling. It should be of great value to all of us. I came here with a good deal of fear and trembling when I thought of tackling this proposition, but with much joy because of the fact that I might find out a few things as to how to keep safety interest moving effectively.

The putting forward of safety, of course, is effected by well-known methods, well known to all of you. *First,* you must have an organization that will handle the proposition. *Second,* you have to put your plant and equipment into a proper and safe condition. *Third,* you have to educate people as to the importance of their own responsibilities to the safety cause, and it is in connection with that educational phase of the subject I imagine most of our remarks this afternoon will be made.

I would like to compare the safety propaganda proposition with the advertising one. Just stop and think for a moment how much courage, effort and variation it takes to keep in an interesting manner before the public for 20 or 30 years a product such as soap—say, Ivory soap, "ninety-nine and four-tenths pure. It floats." That is about all they have to say about that product, and yet, since most of us can remember, the advertising men have been presenting that proposition, the same old truths, in ever-varied form, making it interesting. They have fixed in our minds, in an indelible manner, the merits of their products. If it is possible to sell to people shelter, dwelling houses, rented homes, food and clothing by advertising methods, it ought to be possible, by properly advertising the safety game, to sell to them the ability to secure some, or the maximum measure of shelter and food and clothing. If we can, by advertising, entice people to desert their firesides and go traveling upon the steamship lines and the railroads of the

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country, it seems to me, by our safety advertising propaganda, we ought to be able to get those people to conserve themselves, to have the money and the limbs with which to travel, as well as the inclination. Finally, if by advertising methods, as one of my associates was explaining to me only yesterday, it is possible to sell lots in cemeteries to people, it seems to me we ought to be able to sell them a service which will keep them out of the cemetery just as long as the good Lord will permit.

With that much introductory material, we will take up the Round Table, the program, and you will observe that we have four subdivisions. The first subdivision, written on the board by my associate, Weaver, who once went to college and learned how to do mechanical drawing and lettering, is on "Methods of Keeping Superintendents and Foremen Interested in Safety."

I will ask A. H. Young of the Illinois Steel Company, whom you all know, to get up here and start the ball rolling.

A. H. Young: I think the whole question of the method of keeping the foremen and superintendents interested might be put in a single phrase, for which I claim no originality. In other words, they should be held to a strict accountability, and possibly, when they are held to that strict accountability, something more drastic than a note or another note should be written. It is presumed, in a safety campaign, that the head of the plant is back of it, that he is the power behind the throne, and if you are going to have "Safety First," consider that it means "*Safety First*" and nothing else. It must come ahead of production; it must come ahead of every other thing. Your foremen and your superintendents are the men who must bring this about. If an accident occurs the onus must be put on somebody. It is not to my mind the best practice to put it upon the injured man, even though possibly it is due to his own carelessness. Your educational campaign should be carried to such a point that the foreman is to be held responsible for an accident which occurs, due to carelessness, to his own men. If John Doe carelessly turns over a billet, and that billet falls and catches his thumb on the skid rail, your foreman should have been so much on the job, when John Doe was turning over those billets the number of times he did before he had that accident, he should have seen he was doing it improperly. Therefore, the accident was due not to John Doe's carelessness, but to the fact of John Doe's foreman. That foreman was responsible, because he did not educate John in the proper performance of his duty before the accident happened. If these accidents are repeated by the employes under the care of the same foreman, go back to your superintendent; what has he been doing? The foreman, directly under his supervision, has, possibly, not neglected safety, but he has put other things ahead of safety to such an extent that he has not educated the workmen in the prevention of accidents of this kind.

Therefore, I say, the proper method of accident prevention work on the part of superintendents and foremen is simply to hold them absolutely responsible for every accident that occurs to men under their direction which is not wholly, and by great stretch of imagination, an act of God and not chargeable to carelessness.

Chairman Forster: The subject is now before the Congress. I was talking, the other day, with one of my acquaintances from Alabama, a State that is getting to be very much on the map on the safety proposition. His name is Hatman, and I am going to ask him to tell us what he has been doing along the line of efficiency.

J. G. Hatman (Semet-Solvay Company, Alabama): We have installed a bonus system. A bonus is essentially something that a man gets for nothing. And we have recently installed a premium system whereby we make a man work for what he gets. In a few words, we are paying a man one-half of the savings; or, rather, we are giving him one-half of the savings that he may earn over the cost of the work that has been done in the previous year. In addition, we will give to any man 10 per cent if he has no time-losing accident during the month.

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The results have been astounding. We have two plants in our district, and in one of the plants, in two months' time, we have had about 95,000 hours of work performed, and we have not had a reported accident at the store where we dress the wounds. At our other plant we had about 100,000 hours of work performed this last month, and we had 90 hours of time-losing accidents—two accidents; total time lost, 90 hours. When we think back about six months ago when we had 134 and 200, and 300, and 400 hours of time-losing accidents, we feel that our premium system, and this additional 10 per cent we are paying our men for keeping down accidents, has been well worth what little effort we have used along these lines.

Mr. Morey just asked me if we were paying only the foremen the premium. It includes every man working in the plant, both clerical, mechanical, machine operators and so on. I might add that a coke oven plant, to those who have not been around it, is an extremely hazardous place, because the tools that one works with are very heavy. There is always more or less danger. The ovens themselves are hot and the objects handled are large and the chances for an accident are many.

Chairman Forster: Mr. Hatman, do I understand that you have some of your operations arranged in groups where a foreman and a group of men together are working for a joint bonus, and that this bonus applies to the gang only if nobody on the shift in the gang has an accident?

J. G. Hatman: On that gang, yes. It means, for instance, the brick masons are classed as a group and the pipefitters are classed as a group, and machinists are classed as a group, and so on. Any one group that has no time-losing accident in the course of the month will get this 10 per cent.

W. P. Strickland: Mr. Chairman, I would like to ask if that does not have a tendency to conceal the reporting of accidents? In our own company, at first, we had a great deal of difficulty in getting the smaller accidents reported. We considered offering prizes, but the system has not been installed for that reason. I would like to ask the gentleman if he finds all accidents are reported.

J. G. Hatman: We find all accidents reported. It has been a question of education with us. We have no foreign labor. Our labor is entirely white men and negroes. When I first went South it was a common thing to see a man dig a chunk of coke dust out of another man's eye with a pencil or dirty match. By a system of personal education we have eliminated that entirely, and we have no trouble in getting men to report accidents.

W. E. Firth: May I ask if the bonus system applies to groups of men? For instance, say the bricklayers number 100 and the other classes would amount to probably 500; the probability is that the larger group of men would have more accidents and the smaller group would have fewer. How does the bonus apply in a case of that kind?

J. G. Hatman: The whole thing is based on the cost of the work that was done in the previous year. For instance, we take 1915 as our basis and give the man his premium, which amounts to one-half of the saving that that group has accomplished over the previous month. The brick masons might get $23 apiece individually, and the pipefitters, with only a few men in a gang, may get only $5 apiece. We give the man 10 per cent of the total saving if he has no time-losing accidents, so that each man does not get the same amount of money. It is really the amount of money that he earns for the company which determines how much he is to get.

Chairman Forster: The Youngstown Sheet and Tube people have been giving unusual attention to the subject of holding the foreman's attention. I want to ask Mr. Woltz, if he is in the room, to talk to us upon what they have been doing.

J. M. Woltz: Mr. Weaver came to our plant and laid before us the proposition of a fire and accident prevention day, and after consulting with the management it was decided that we would not only celebrate October 9 as Fire and Accident Prevention Day, but we would devote a whole week to that proposition. I asked the management if it would be

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willing to give a gold watch to each foreman who could show during that time that he had had no lost-time accident, and it agreed to do so. We had 500 large posters printed, and we distributed them throughout the plant, announcing the fact that the governor of the State had issued a proclamation designating October 9 as Fire and Accident Prevention Day. Seventy-nine letters were written to various ministers and priests in the city and villages surrounding our plant, asking that on the Sunday preceding this day they mention in their sermons, or prior to beginning of the services, the fact that this effort was to be made by our company during the week. Short articles were prepared each day for the few daily papers. We had large score boards prepared for each department, with the names of the foremen. We also placed score boards at each entrance. The first score boards were for departments only. Those at the entrances showed the number of accidents by departments for the entire plant during the week. They were posted every morning. We had about 150 foremen who were eligible to watches, and I think that we will have almost 150 foremen to give watches to. Our off-time accidents, as shown by a schedule that I have here, were reduced more than 70 per cent during that week. We average about 10 off-time accidents per day, ordinarily. Even our first-aid accidents, which would not be charged against the foreman, were reduced about 50 per cent. The plan has been a success, I believe, because the management announced, prior to my departure, that those foremen who were not included in this contest would be included in another which they wished to be held shortly.

Charles B. Scott (Chicago): I am a little reluctant to voice what I have to say, and yet I always try to look at these matters in an unprejudiced and unbiased way. Isn't there some inconsistency between the plan which was mentioned by Mr. Young and the bonus and prize plan as now being presented? I believe that fundamentally the giving of prizes and bonuses to foremen and superintendents is wrong in practice. I agree with Mr. Young that safety must be a part of the operation of the industry. The best way in which to get the superintendents interested is to give them orders from the executive department that safety and accident prevention is to be a part of their operation, and to educate the organization and bring out a perfected organization in which accident prevention is a part of the daily operation of the plant.

Chairman Forster: There is nothing quite so delightful to me as a healthy difference of opinion. Mr. Scott and Mr. Young have dissented, and Mr. Woltz and Mr. Hatman have demonstrated successfully the other method of work. Let's have some more discussion on this.

Dr. Otto P. Geier (Employers' Service Department, Cincinnati Milling Machine Company): I do not not believe in this method for the foremen and superintendent, but when it comes to prizes to the working force I believe that we can frequently employ prize methods for introducing new zeal, energy and interest in the safety movement. I have under consideration now a plan which I should like to hear discussed. It is one that would emphasize interest in the safety bulletins which this council is putting into our plants every week. I propose, at a near date, to post in a prominent place in the service room, 15 or 20 of what I consider to be the best bulletins that this council has published so far. I propose to start a contest among the men which shall be covered somewhat like this: "Which is the best bulletin for our plant, and why?" "Which of these bulletins is the best in relation to your department, and why?" "What safety measures are most needed in your particular department; and what health measures are most needed in your department?" I believe, if the prize money is distributed wisely, a great number of prizes is superior to a few large ones, and that it will be a good investment. I think if we make it impressive that we do not care for English for diction, but we are interested in their ideas, we can by that method possibly stimulate interest in our bulletins. It will accomplish more than just that one

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thing in that one week. If we awaken them at this particular contest time on the bulletin service we hope to keep it for the next six months, and we will try it again. I should like to have an opinion on the proposed plan.

Chairman Forster: It would seem to your chairman, if a man is to be paid for improving his manufacturing efficiency, his conservation of repair parts, or anything else which is supposed to be his business, and for which he is paid—for being a superintendent or foreman—that there is nothing inconsistent in giving a man something in the way of a premium or bonus for putting forward more successfully than before the safety work which is a part of his regular duty,

Walter Greenwood (Carnegie Steel Company, Youngstown, Ohio): In discussing this question I am practically called upon to reiterate the statements I have always made heretofore on this subject, and they are included in what Mr. Young has already said and what Mr. Scott has already said. Every man who is held accountable for accidents—every foreman—should be required to make an appearance before somebody in authority, like the general manager, and explain the accident. That is practically my idea of how he should be held responsible. I have kept a little bit in touch with statistical work, and it is a fad with me to be interested in statistics. With a corporation that employs about 40,000 men the average lost-time accidents, including those that have lost only a day, is about 1½ per cent. I know one plant where the average is not above 1 per cent of employes. The figures that have been given would show something like 4 per cent or 300 accidents in a month with about 8,000 employes.

It seems to me that if the bonus system was effective in making that great reduction, and in the other case where the foremen are held responsible, we have a much lower accident record—that we could save that bonus and apply the other system.

Earl B. Morgan: I would like to ask Mr. Woltz a question, in view of what he just told us. After he has given these prizes and the effect has died out, what is he going to do to renew it? Presently these 150 foremen will have their watches and the effect is going to die out.

The point is just this: What is going to be the limit to this gift business? You cannot go to the management every month and say: "I am going to give automobiles, this, that and the other thing." I would like to know what the plans are. I am not criticising at all.

J. M. Woltz: We have held our foremen strictly accountable for all accidents. Every month every foreman in our plant is sent a report showing the number of first-aid accidents, the number of off-time accidents, the number of infections, and what the cost of each first-aid, off-time accident, and infection has been. We frequently resort to discipline, where it is found that there are too many infections under a foreman or in a department. We believe that if we arouse a certain amount of enthusiasm by special prizes that enthusiasm is going to last for a considerable length of time, and it is going to be up to the safety department to evolve some other method of arousing interest.

H. A. Bullock (Brooklyn Rapid Transit Company): In the transportation industry there is a little different problem, I think, inasmuch as the subordinates, intermediate officials, superintendents, assistant superintendents, depot masters, dispatchers, trainmasters, and so on, are in an intimate disciplinary relation with the employe, which is a rather different thing than the disciplinary relation which exists between the foreman of the industrial concern and his men. In an organization of that kind, I believe that one of the essential things in keeping your intermediate officials, who correspond with the foremen of your industrial plant, interested, is, first, in constructing your safety organization so that your safety work and your regular routine operating relations are intimately linked into each other, making the superintendents realize that their hold upon their men personally—and every operating superintendent knows that the efficiency of his division depends upon the personal hold upon the men—that his personal hold upon the

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men can be intimately developed, as in no other way, by the carrying on of efficient and continuous safety work. Among the employes that can be done not only with respect to such matters as safety bulletins and the study of accidents, but it can be done by co-ordinating your safety committees with your welfare work, if you please, letting the safety committee run a baseball game, letting the safety committee have to do with the conduct of men in and around the depot, as we do on our system and as other railroads do.

J. M. Eaton: In theory I heartily agree with Mr. Young and the other gentlemen who have spoken along the same lines, but in practice I do not believe it works out. I would like to ask Mr. Young, or any other gentleman here who has followed safety work along the lines that he has, if he can cite one instance where a foreman or superintendent has been discharged or disciplined in any way for an infraction of safety rules in his plant.

H. L. Gannett: One of our foremen had a workman under his charge who had both his hands burned off. That foreman was laid off for a month.

Chairman Forster: Gentlemen, our time allowance for this first section is exhausted. While I should like to keep it going a while longer, as I enjoy standing here hitting the table with the gavel, it is my pleasure to turn it over to J. A. Robertson, of Rochester.

J. A. ROBERTSON, CHAIRMAN

Chairman Robertson: The subject assigned to me is one that I know the least about, and that is "Interesting the Employer." I never had any trouble interesting my employer, and I have not had very much experience in interesting other employers. The only experience I had was when our friends Campbell and Cameron came to Rochester and we started the Safety Council. I spent two days driving around with them and we adopted strenuous methods. We went into a man's office and held him up, and he said: "What is it?" We said: "We do not need to wait and explain it, we want your signature for membership in this when it is started."

Mr. Forster has robbed us of so much time that we have got to get down to business. I understand, on this subject, we have an expert, Mr. F. P. Sinn, of the New Jersey Zinc Company, and I am going to ask him to shoot the first gun.

F. P. Sinn: I have never had any trouble in getting my employer to see his way clear to appropriate money or spend money for safety work. Sometimes it is a little hard to show that you are doing a little better each year. It is necessary to state reasons and show causes for getting more money. First of all, we can cover the humanitarian point of view. That point of view develops, I believe, a certain spirit of helpfulness. You get co-operation with your employes. You go to your employe and you say: "We want to cut down accidents; we want to prevent your being hurt. You are interested in this; you are the biggest loser, if you are hurt. On the other hand, we are going to gain, too; we are going to gain compensation, if you are not hurt." You can tell your employer that that is one of the things you do.

There is another thing you can tell your employer, and in some cases it is the most important thing you can tell him: That there is money in it; that the money you spend comes back, and comes back again several times. First of all, if you can prevent accidents, you save compensation payments. After every accident—or at the time of an accident—there is a certain amount of excitement in the shop or in the plant; work is generally interrupted. That means a cutting down of production; there is a loss of money there. The man, if he is seriously hurt, has to be replaced. That means hiring a new man, and that costs money.

There is another point. It is a big asset to have your plant known as a safe plant, that men are not liable to get hurt there. A plant that has a reputation of that sort has a small turn-over; it employs fewer men to keep its average working force going.

The safety engineer of one of the large steel companies told me that the turn-over in their plant was over 300 per

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cent. We figured up just what that meant, taking the figure of $50 for each man employed. That covers not only the cost of hiring the man but the cost of breaking him in, the loss of product which he loses in learning his job, and I think it is generally conceded that $50 per man hired is not too high. Figuring it on that basis, that company lost 20 per cent on its total common stock in one year due to its large turn-over. I do not say that you can cut down all of that turn-over, but you can tell your employer that if you get a safe plant you can cut down a large part of it.

Chairman Robertson: Those are the views of one of the conscriptionists. Now we want a volunteer.

E. K. Pritchett (Grand Rapids, Mich.): A number of years ago the Grand Rapids Veneer Works had vats for softening logs which are turned into veneer. They were at that time entirely unguarded and were on a level with the floor; they are large holes and may be three or four feet below the surface. In the winter and fall when the weather is cold, the steam from the vats obscures their openings almost entirely. The manager told his superintendent that these should be guarded. Mr. Superintendent had been working around those vats for a number of years without an accident. His attention was called to it again, and he failed to provide any guards or rails around these openings. Within ten days or two weeks a man fell into the vat, and, needless to say, he lived but a short time. The superintendent, of course, was shocked, and he promised at the deathbed of this man to provide guards and observe greater care. He put it off, however, for another week. He had some reason why it had not been done. In exactly seven days from the first accident, the superintendent himself and two other men fell into the vats. The superintendent and one man died. The other man happened to catch himself in a way that only his feet were burned, and he was saved. Since that time that plant has been transformed into the safest plant in Grand Rapids. They have installed all safety devices; they have gone into a campaign of education for their men.

L. A. De Blois: I might give you a little personal experience with a manager of a plant, employing about 15,000 men, who was a stickler for accident work. About a year ago we started out by almost forcibly bringing him to the safety congress in Philadelphia. We arranged a little lunch at the Bellevue, picked out four or five good safety live wires and put them next to the situation. Then we went around to find our superintendent. We took him out and drove him up to lunch. After that we took him to the round table discussion, and it was a revelation to him. He asked a good many questions of me during the meeting. I think he went back with an entirely different idea of the whole safety question. His final conversion happened when we took him to a safety meeting of his own employes, in his own plant, and made him get up and address them. He had a little speech committed to memory, but he forgot parts of it and left out other parts. But he woke up and toward the end of the meeting he was seriously interrupting the progress of business because he was making little speeches every now and then. Since that time he has been a converted man.

F. D. Ensminger: I represent the Prest-O-Lite Company, home office in Indianapolis, doing business in 21 States, several islands and foreign possessions, and working under 17 different workmen's compensation laws. There is one point that seems to me of vital importance in interesting the Prest-O-Lite Company to take up safety work. In practically every workmen's compensation law it provides that an employer must carry insurance, unless he has the idea that he wants to carry his own risk. Our secretary and treasurer came to me and said: "Let's try this out once by carrying our own risk. Let's not carry insurance this year." Every week or two an accident would happen that would jab his pocketbook to such an extent that I will say to you he has not got the safety idea from a dollars and cents standpoint alone. It did not affect him from a dollars and cents standpoint, but in trying to cut down that he was protecting his workmen. I say to you men, there are

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representatives, no doubt, from practically every State which has a workmen's compensation law; if you will go back home with the idea of remedying your workmen's compensation laws and holding it as a club over your employers' head and let him carry the burden instead of letting somebody else carry it, you will soon have all of your men interested in safety work.

Chairman Robertson: We have another of the conscriptionists who is prepared. Mr. Avery, of the Avery Company of Peoria, Ill., one of the livest safety organizations in the United States. We want to hear how they got him interested.

G. L. Avery (Avery Company, Peoria, Ill.): Our president has said when he turned anything of his over to be done: "Do something; I don't care what it is. If you make a mistake I know you will not do it the next time." When the job in connection with the compensation act, that was referred to, was given me, it was right up to me to do something. We got to work, outlined the physical examination proposition. I said that we were not going to be subject to a $3,500 sting for a rupture or a hernia; we were going to find the physical condition of every man and put him at work compatible with his physical condition. The result was that when we started our dispensary our president came in Sunday when we were getting things ready. He said: "Well, how soon are you boys going to be ready?" "In just a few minutes." "Well," he says, "what is good for the men is good for me. What do you want?" "Pull off your coat and vest, and we will see what is inside of you." We went after him and he was under our supervision for a year and a half. He is in better physical condition than he was 10 years ago. We have not had any trouble since in convincing him or any of the employes.

A short time ago one of our men came in and he said: "You are going to go after me one of these days, because I have been in here six or seven times on account of accidents. I cannot help it; it is the man you put on the truck with me. He is a green man, does not know anything about this work, and he does not lift the thing right, and I get hurt and come in here and I suppose I will lose my job." I said to him: "Gilbert, I am going to break a rule, an ordinary rule in business. You pick out the helper that you want." He picked him out. We have not had any trouble. That went all through the whole plant; that interested the men. It also interested the employer, because the foremen became interested.

Another thing we have found in safety work, and that was a safety cap. All men in the shop like to wear a cap to keep the dust and grease out of their hair, so we found a little cap and over the top of the visor we put the words "Safety First" and put our trademark on either side.

I heard one of the boys say the other day: "You had better take that cap off; it don't mean anything to you; you have just got "Safety First" on the outside. You had better get it inside."

Chairman Robertson: You have heard all these gentlemen speak, but there may be some young man, some safety engineer in this audience who, despite all that has been said, still does not see his way clear to get his employer interested. If there is anyone here who is in that attitude we would like him to present his difficulties. I think we will find someone in the audience who will give him suggestions to help him out of his difficulties.

Mr. McLaughlin: In the small power company, and I think it applies also to the small manufacturer, very few accidents are happening where you have a small number of men. A man may say: "We have not had an accident for five years." When they do have an accident, it is a very serious one. What is the best way to convince that man that accident prevention is a good thing?

W. G. Ashton (Oklahoma): Your greatest weapon in interesting the employers is the State departments that administer your factory inspection and compensation laws. If they will use diplomacy and not so much law, co-operate instead of fighting, you will interest the small employer of labor. I do not think there is a State in the Union that has more small employers than we

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have. We are interesting the little employer with two or three employes, and we are doing it, not by compelling him to do something, but by working on him through the man who has taken up the safety proposition because he knows that it is good sound business.

Along that line I want to say that the National Safety Council has done more in putting a field secretary in service than any other one thing that I can think of. You know that the average manufacturer is just a little suspicious of everyone except the man who is in the same line of business with him.

Chairman Robertson: I will call on the field secretary to give us his opinions and then close this session.

C. W. Price: Having in mind the young men that may be present at this conference, referred to by our chairman, men who are young in this game, who probably have their conservative employers yet unconverted, I want to say this: That as the result of my five years' experience in this work, in which practically every day I went personally to see a manager in his office—in most cases a manager who knew very little about safety work—I learned two things in regard to how to really interest and get the manager with you. First, the point which has been emphasized all the way through of proving to him, by placing before him specifically the experience of various companies with regard to the reductions they had made and the money they had saved. Second, placing before him in a thoroughgoing manner, detail after detail, the way to organize; make it perfectly simple and explain it to him, leave it in writing on his desk. Place before him photographs or cards. In other words, show him specifically how to take care of his situation, so that you convince him that it is easy and not difficult. You overcome the doubts that every manager has in his own mind. You make him feel that now he has the experience of companies that have actually done it—have invested their money and have achieved results—and if he will invest his money he, too, will be sure of those results.

R. S. Albert (Workman's Compensation Bureau): One gentleman here has hit the nail on the head when he spoke of the small manufacturer. The small manufacturer cannot carry his own insurance. There is no State in the Union that has so many small manufacturers as New York State. There are more manufacturers in the metropolitan district of New York State than almost any other two States in the Union. What has done more to reduce accidents in these small plants than anything else is the bulletins issued by the National Safety Council. Those bulletins have been placed in the hands of the small manufacturers by the insurance companies doing business in the State. They have introduced the proofs to him that if he will put in a working safety organization that was actually effective, at least he could get a reduction in his rate. Money talks to him just as it does to the big fellow. We have introduced the bulletins of the National Safety Council and they are renewed every week. That has done more than any one thing.

Chairman Robertson: Now, ladies and gentlemen, we are going to keep on; I am just going to close the discussion on this subject. (Short intermission.)

Chairman Forster: The third subject before the council this afternoon is, as you know from your programs, "Unusual Methods of Using National Safety Council and Home-Made Bulletins." The gentleman who is to have the pleasure of swinging the gavel for the next 40 or 45 minutes is one of the shining lights, one of the eloquent preachers in the safety movement, Mr. "Marcus Aurelius Julius Caesar" Dow, as the moving picture film classified him yesterday.

MARCUS A. DOW, CHAIRMAN

Chairman Dow: I thank you for that nom-de-plume. We all know that one of the most valuable services rendered by the National Safety Council is the distribution of its weekly bulletins. The council is anxious, if possible, to improve that splendid service. I think that we all agree that the greatest accident-preventive influence lies in the education of the workman.

It is not possible to hold safety rallies in your plants every day, and this educational work must be continuous and

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constructive in character. So the popular form of this educational work seems to be in the bulletin service. We want to hear from as many of you this afternoon as we can how to improve this bulletin service, or any new or unusual methods for using and preparing bulletins.

L. A. Larsen (American Locomotive Company): The elements of a good bulletin, it seems to me, are two. One is it has to be original, and the second is that it has to be personal.

I am more inclined to think that the latter element is the more important one. When I say it has to be original, I mean that it has to hit the nail on the head at the plant where it is posted.

We are firm believers in issuing and printing our own bulletins. I say that without disparagement to the National Safety Council. We use their bulletins; we use many of them. Our company is large enough, however, so that we can afford to issue our own bulletins. We issue four bulletins every two weeks; three are our own and one is from the National Safety Council.

When I say that a bulletin has to be personal, I mean it has to appeal to the imagination of the workman. For example, we issued a bulletin some time ago that read something like this: A personal letter from "John Jones" to his fellow workmen. It went on to say: "I have worked in the Schenectady plant of the American Locomotive Company for many years. I have been reading the bulletins of the American Locomotive Company. I read all about the eye hazards, but I never paid much attention until I lost my own eye. Now my chief aim, in connection with safety, is to keep my other eye." He signed his name to it. He folded it and mailed it to the workmen and posted it on the bulletin boards. That bulletin meant a great deal more to the men who knew this man than any number of eye bulletins showing illustrations or photographs of men who had lost their eyes in other industries of other plants.

A man comes into the works every morning; he goes out every noon, comes in again in the afternoon and goes out again every night. If the bulletin looks the same today as it did yesterday he is not going to stop to read it, consequently we have to change it. We have a bulletin the size of the bulletin board which says: "The shop hospital is such and such a place. Go there. Have slight injuries attended to." One of our difficulties was to have the new men go to the hospital to have slight injuries attended to. We have had another departure at the same plant in using a blackboard. We change the reading on the blackboard every week. I made one suggestion to the safety inspector, that he put the heading of what he had to say in red pencil and the bulk of his bulletin in white. He erases that every week. They look for that; it is new. In other words, it has to be novel; it has to surprise the men. They have to know there is something there that they have not read before.

Another point: If we have a bulletin board that has 8 or 10 bulletins on it, a man comes along and reads them, but he cannot carry away what he has read in the 8 bulletins. He carries away what is given in one or two. If he can only read one or two at a time it will make a greater impression on him and he will be able to carry it away in much better shape than if he reads 8 or 10.

. I might mention here that we are strong believers in the calendar idea. We made our first effort last year to get out a calendar. We are getting out one for next year, in spite of increased price of ink and paper. We hand these calendars out to every workman in the plant. We are printing from 16,000 to 18,000 this year. They are handed out as the men leave.

We started out by writing our own bulletins in our main office. We gradually departed from that and tried to get our local men to write them. We go even farther than that. We try to get men below the local men to suggest bulletins and send them on for use. In other words, we try to issue what the men send to us. The farther down the ranks you go, the closer you come to the men who are apt to be injured or the men who have been injured, and the more effective will your bulletins be and the further your lesson will go.

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Chairman Dow: Mr. Forster has just told me that the National Safety Council reproduces more of the American Locomotive bulletins than those of any other concern. I want to ask this one question: Mr. Larsen speaks of using illustrations of accidents in his own plant. I assume, of course, that he is referring to bulletins that are illustrated by photographs. Not long ago we took some pictures in one of our shops of several men who had lost an eye by working without goggles, and we found that the men in that particular shop objected to having these bulletins with their picture posted in that shop where they were employed. Have any of you found any objection from that source?

J. C. Smith: Our people object to bulletins showing mutilation. I think instead of showing bulletins of several men with their eyes out, it is better to show a bulletin with about 15 or 16 pairs of goggles fastened to it which have saved eyes. We have done that at our plant, and it has attracted a great deal of attention and done a lot of good.

Not very long ago we felt a need of different kinds of bulletins. We had used all that were gotten up. I wanted something new. I was looking through some magazines and I took some colored pictures out of those magazines. For instance, I took one picture of a baby sitting in a high chair holding up his hand, with a spoon in his hand. You are probably all familiar with that particular advertisement. I posted that on a piece of white cardboard and with a red pencil wrote at the top of the cardboard: "Dad, don't take a chance." Then below that I wrote: "I want a chance when I grow up." Another one was a picture of a bride—a very pretty bride. We put at the top of the picture: "Get married to the safety habit. Don't take chances—avoid accidents." We got up another one showing a nice picture of a home: "Protect your home. Get the safety habit."

Herbert S. Walton (Montreal plant, American Locomotive Company): An idea came to me when we had so many infection cases. I thought of a larger bulletin. That seemed to cut down the infection cases considerably. I favor one bulletin of a fair size which must be made in proportion to the size of print that can be seen when passing to and fro. Most of our men are piece workers. We usually change the National Safety Council bulletins weekly, and I must say that the employes look for them. One way would be to place new bulletins on the board which first comes to their attention at the entrance, and then the following week shift them back, so that you have different bulletin boards or different bulletins on the different boards.

A method which we have tried and found very successful is to make up the old bulletins into sets of, say, a dozen or fifteen, and announce that there will be a distribution of these bulletins. We have had employes come and ask for them in order to take them home. Some of the employes like to have bulletins on statistics, others on guarding machinery, etc., and we try, as near as possible, to give them the bulletins which are most interesting to them. We classify them as nearly as possible.

I am not going to speak on this subject generally; I am simply going to state a few methods that we have found successful. We usually, if possible, get a picture of an accident; that is, have it posed for, showing how it happened. For instance, we had a man the other day working a milling machine who was wiping chips away with a piece of cloth. The cloth caught in the machine and he lost the end of his finger. Now, we get the man himself, when he recovers sufficiently, to pose for that picture, and he does it willingly. We have yet to find the man who will refuse to pose for a picture, and he is only too willing to have the bulletin posted up. We also take pictures in our inspections of any defects we find in the plant, and at our foremen's meetings, which occur every second Tuesday, we use a projecting machine and throw the picture on the screen. The safety committees have a form which they fill out, showing the defects, and then we have that reprinted showing what disposal we have made of these defects—what action has been taken. These are posted on the bulletin boards, and the men can see what has been done. The names of the various

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safety committees are there, so that any employe can go to the member of the safety committee and report any defect when it comes directly to his attention.

As the result of a suggestion received from one of our employes, we started individual bulletins, a small cardholder of about three by four inches, fastened to each machine and also over the drinking fountain. Every man in the plant, some time or other during the day, goes to the drinking fountain and he sees that small bulletin in front of him and he reads it. These small cards deal with some particular point in the plant, such as leaving crates or other material in the aisles and a thousand and one different subjects that can be used. We could use a boy and send him around to change these cards, but we don't. I usually do that myself, for this reason: It gives me an opportunity to inspect that machine and the cards and engage in conversation with the operator, and you would be surprised to find the amount of information that I can get from them by that method.

Mr. Singer: May I ask a question, whether or not you find the employe will pay closer attention to a bulletin that has some picture on it than a bulletin wholly of reading matter? And another question: What do you use on your pay envelopes, and whether you make them up yourself, and what do you put on them to catch attention? I believe that I got my first idea of using the pay envelope as an advertising medium from the Eastman Kodak Company.

C. H. Thompson (Eastman Kodak Company): I find that a bulletin with a picture attracts more attention than one with only printed matter, unless that printed matter is very large to attract the eye. The matter we use on the pay envelope must be short and sweet, because the man is more interested in what is inside of the envelope than what is on the outside. We use mottoes made by ourselves. Sometimes our employes suggest a motto for the pay envelopes and we use it. Many of the boys speak to me on my rounds and say, "How would this do for the pay envelope?" If it is a good idea we use it. We get a great many mottoes for the pay envelope from the pamphlet that was issued by the National Safety Council some time ago.

Chairman Dow: Do any of you who use illustrated home-made bulletins use cartoons for illustrating them instead of photographs? If you do, do you find the cartoons attract more attention than the other illustrations, and, if so, is their effect destroyed for the reason that they are treated as a joke by the men?

L. A. DeBlois (Du Pont Powder Company): We employed a cartoonist, a pretty good workman. We gave him the idea, taken from the most common accidents, got him to draw cartoons and put them out weekly on the bulletin board. The idea was that you will get men to read a joke when they won't come to read serious literature. It worked very well. A great many people seemed to think that treating a serious subject with levity would be harmful. I do not think it did any harm. I think it did a great deal of good, because it got the men there, and when they were there they read things they would not have done otherwise. We ran it for only 12 sketches and 12 scenes, because of the expense.

C. G. Coons (New Jersey): I would like to suggest to the manager of the bulletin service bureau that he occasionally send through a bulletin printed in a foreign language, say, the first week in Polish, the next week in Slavish, after that in Roumanian, or whatever language it may be. I have good reasons for wanting this, as I have distributed the bulletins throughout the plant, and watched the men gathering around, and I stood back and watched them going through their arguments trying to figure out from the photograph what was meant by that bulletin. The English bulletins reach only about 25 per cent of the workmen in our plant. Why not send, especially to the iron and steel section, a bulletin that would reach the other 75 per cent, and give them a chance to read something from their fatherland? If you touch their home spot you are going to get some action.

H. J. Aldrich (Buffalo): In speaking of the bulletins in foreign languages, I want to say that I agree with the gentleman who has just spoken. In my work

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I have adopted the idea of taking the Safety Council bulletins and having the reading matter upon these bulletins translated into Polish, as we have a number of Polish employes in our plant. I get one of the men in the plant who is competent to give me a translation of it. Then I have one of the typewriter girls in the office print them on the typewriter. She usually has to make six or seven copies before she gets it right. Then, with a pen, I put the diacritical marks on the English alphabet. I paste it at the bottom of the bulletin and put it on the board, and I have found it produced good results among the foreign element. In fact, they seem to take more interest in the bulletin board than the English-speaking element.

Mr. Belmer (St. Louis): As regards bulletins in foreign languages, a little suggestion presents itself to me. There is a danger in having bulletins relating to technical matters translated into the foreign languages. That danger lies in the use of incorrect phrases. I have noticed in several of these bulletins that workmen laughed at the translation of their language. That can be guarded against by having the translation of the bulletins for safety work made by men that really understand something about safety work, not, perhaps, by a college professor that academically knows the language he is trying to translate.

G. A. Cowee (Utica Mutual Compensation Insurance Corporation): I might add that we have boards on which we have the wording printed first in English on the bulletin and then a large heading, "Polski" (Polish) and "Italiani" (Italian). We figure that the Polish and Italian will cover about 80 per cent of the foreign employes in the plants that we insure. The previous speaker suggested the matter of eliminating mistakes in phrasing, that is, relating to foreign phrases. We employ a Polish printer who issues a newspaper, and also an Italian printer who publishes a paper, both of whom are in Utica, and we believe by that method we are absolutely safe in securing a correct translation. It seems to me that where there are so many foreigners employed through all the mills in the country that we are not hitting the nail on the head until we do get to these men in their own language. If they see something in their own language they stop and look at it and read it. If they see it in the English language they do not pay any attention to it.

Chairman Dow: I would like to hear some of the experiences of Earl B. Morgan, of the Norton Company.

Earl B. Morgan: There is only one piece of thunder that has escaped here which is left for me to comment on. Nobody has really said anything about what I consider the most important feature of the bulletin service, and that is the bulletin board itself.

The bulletin board, in the first place, should be designed not only with a depth to accommodate a paper, but to put a goggle in, or rivet heads which are sheared off and hit a man in the eye. Exhibits of that sort bring a good punch with them. In the second place, I think the bulletin board adopted in the average industrial plant should have a glass sash. You will often go into a place and see a bulletin board with nothing on it. How much better to have a board, for a slight additional expense, of good enameled steel and signs on it with some good adopted slogan. If your board is an enameled steel sign, it does not handicap you if you want to repaint the board. If you paint the sign on it, all you have to do is to reletter it again. You can get a good enameled steel sign for a bulletin board as cheap as you can paint it.

Another important feature about bulletin boards is the location of the board itself—putting it where it will be seen every day by the men. You want to change your material every day if you are going to keep it up to snuff. If you let it go even for a day, a man is going to pass that board and say: "I saw that yesterday."

There is another point our friend from Canada brought out which we have adopted and think it is a good thing: Put just one bulletin in the board per day and drive that one punch home. If you have four of them there it takes four times as long to read it and your production people are going to raise a reasonable kick that the man looks too long

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at the bulletin board instead of working. They can get one big sign as they go by and stop just for a moment.

Another point has been brought up about printing your own bulletins. All firms are not so fortunate as to be large enough to print their own bulletins, but one can very easily take photographs, say, from unsafe and safe practices, place them on the board and put a typewritten description below. We have found that these attract more attention and bring better results and comments among the men than to have a halftone put on the board. The picture is actually taken there and they know John Smith was in it.

One other point: There is a mighty good place for a bulletin and that is the employment office. We get out a bulletin which has the wording on it, "To all applicants for employment." Right there is when your man is receptive, and he is going to read anything you put there in order to get a job. After he gets the job you are going to find it hard to interest him. While he is waiting there, if you have an employment office, if you have a safety bulletin which you can hand him, he will read it, and it will put over a good punch.

Chairman Dow: I would like to press the question regarding bulletins of a grewsome character. Will somebody speak on that topic before closing?

F. W. Shepard (Birmingham, Ala.): We found it did not pay to do that. We had two moving picture machines at our plant, and pictures of that kind do not appeal to the men. We take a man and act as nearly as we can the way the accident happened and take a picture of that, show it on the slides in our machines, and that gets results. We give a description of the picture and leave the man's name off—do not mention the man's name at all—but we say: "An employe was hurt while doing this operation in this way." Then we show the correct way to do the operation. That gives us results.

Mr. Merkle (Atlanta, Ga.): I refer especially to a bulletin that came out showing a badly infected arm due to a slight scratch. We posted that in our wire department. We make barb wire, which is very dangerous, poisonous, and the machines move very fast. There is not a man in the mill who gets a slight scratch who does not immediately stop his machine and report to the hospital to be taken care of, principally through that one bulletin that we put throughout the plant. It has taught a lesson to 1,000 men. They are principally colored men. I think a grewsome picture, unless it is too horrible, is just the thing to bring home your point to the men.

S. G. Watkins (Boston & Maine): Hardly a man in a shop, or on a railroad, but has seen an accident, and that is all the picture he needs. That picture stays with him, and you do not need any grewsome picture posted upon a bulletin board. I will tell you what I believe counts: Just put on your bulletin boards the number of times that that accident occurs, and then the man gets into his mind the chance he is taking. If it happens once to every 100 men he doesn't know but what he is the next man that will get it. Just let him know how often that accident happens, and he has the picture.

A Member: A grewsome bulletin corresponds to a medical clinic. Few of us want to go to a medical clinic every morning after breakfast. We would rather go to our office or to church, or go out and play golf. At a proper time a visit to a medical clinic may be of great importance to us, and it may be the means of saving our life. For instance, a subject such as infection will lend itself to a grewsome bulletin, and the picture of an infected arm tells an important story. On the other hand, to show on a curtain a picture of a workman being drawn into a machine we repeat a picture which the man knows, and is an accident which does not happen frequently. I do not believe that that type of a grewsome bulletin is of great value, but a certain percentage of bulletins calling attention to the results of neglect, I believe, are of substantial value in a bulletin service. We must remember one more thing: When we first start to teach safety to a force of men or to a community we have to make a dent in the minds of that force of men, and we have to use, to some extent,

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strong-arm pictorial methods. After you have made your dent, and after your force of men realize that safety to that board, or to that community, is an essential element, then you have to change, as I believe, your emphasis, and get over to the constructive rather than the destructive side and build up on more or less pleasant and happy lines.

W. H. Cameron: I want to take this opportunity to explain to you the policy of the Council with respect to translating bulletins into foreign languages. There are just three reasons at the present time why we have not translated these bulletins into foreign languages. *First:* The expense. It will cost us two or three times as much to print these bulletins in foreign languages as in English. *Second:* We would have to print them in from 16 to 20 languages. In some of our steel plants alone they employ from 16 to 20 different classes of foreign-speaking workmen. *Third:* The Council is more or less in sympathy with the proposed Americanization plan of teaching the foreigners English.

Chairman Forster: The last of the four topics on which we are discussing this subject of maintaining interest is entitled "Value of Shop Magazines, Suggestion Boxes and Prizes in Stimulating Safety Work." We have only two original round table experts, C. W. Price being one and Lew R. Palmer the other. Mr. Palmer has the chair.

LEW R. PALMER, CHAIRMAN

Chairman Palmer: This is the fourth period of this game, and I will ask Mr. Fonda to kick off the ball.

George T. Fonda (Bethlehem Steel Company): I am going to sidestep "Shop Magazines" and "Suggestion Boxes," and refer to "Prizes" and "Stimulating Interest," particularly among the men in the shop. We started out with a safety committee in every department, with a permanent member on each of those committees. That permanent member stays on the job as long as he behaves himself and acts safe. In no instance have we had to change our permanent safety committeeman. We start the committees with the beginning of the year, that is, from the time of our annual first aid meeting, about which I will say something in a moment. The men go through a service of one year in detail instruction and first aid under our surgeons and under the men who handle the educational work of these different departmental committees. The first-aid meeting, which occurred this year on the 30th of September, is our second annual meeting. We intend to hold meetings every year, and we have a perpetual trophy which the department holds the year following the meet. In addition to that prizes are given to those teams winning first, second and third. This year our first prize was a trip to one of the games of the world's series, and we happened to pick that 14-inning game in Boston. I do not have to tell you what the result was. Those fellows are talking about it yet. You never saw two and a half hours of baseball like it in your life, and every one of them appreciates what he drew.

The second year of their instruction, which follows the meet, is the active departmental committee work. Those men are called together in groups every week and report on the safe and unsafe conditions in their department and handle whatever first aid work is necessary as a result of accidents which may occur in their respective departments. The new men who are getting the educational work first-hand, preparatory to the meets, are not allowed to handle first aid work in the departments, except secondarily to the men who have qualified by going through our meet.

The bonus scheme is all right. We have not used that for safety work as yet. We are considering it. We have not determined that we shall use it. We have put all the emphasis on pep in the organization, and we have kept the men on their toes by simply firing things at them unexpectedly from different angles and kept their interest. There are some 400 men that are taking instruction, and, of course, as the meets develop, the graduates, as you might call them, will increase until that body is of considerable size. No consecutive year will we allow the same teams to compete for a department. It must be an entirely new personnel, with one exception—the

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permanent safety committeeman can enter the meet all that time to make a base for which the other men are formed around, but he cannot act as captain of the team, so that it develops a new captain every year. It develops five new men if that permanent man happens to stay on the committee. The men that are active departmental committeemen are organized, and they will have their own officers, hold their own meetings, their own Dutch lunches, in a suitable room that we are fast completing in our new dispensary building, where we will have a library and so on, in the basement. We have the organization of permanent committeemen, which we will hold together as a separate body, and the organization of our graduate committeemen, divided, of course, into divisions as the number of new men increases.

That is, roughly, our scheme of keeping these men together. It is entirely, as I say, up to our organization to keep them alive and full of pep by different stunts that we can work up independent of any bonus scheme that we may develop a little later on.

Thomas Stanion (Commonwealth Steel Company): Each of these divisions, these suggestions, the prizes and the plant magazine have a decided part in safety work. At the Commonwealth we have used the suggestions to very good advantage. Two heads are better than one, and if you have 2,000 men in your plant trying to turn in ideas that are for the betterment of conditions, or for more efficient ways of working, it is going to give far greater results than only 20 or 50, or 100 of the foremen. And yet, the suggested ideas must be handled differently. There must be a distinct differentiation between a suggestion which is something new and novel as against something which merely reports a condition which should be repaired and taken care of.

The plant magazine is a good idea. It takes the message home. The goal of educational work is to have every man in the plant get the safety habit, and he is going to get that far better—it is going to make a much greater impression on him—if it gets to the folks at home. So, if in our plant magazine, we can send a message home to the folks it is going to arouse their interest, it is going to make them ask, that is, the children ask their father, something about safety work. The wife will be interested in what safety work is and what it means. You have to get the safety habit inculcated in their minds through the home.

Prizes have been discussed very thoroughly. They can be used to good advantage. They can be much easier used to disadvantage. If they can be handled safely in your local conditions—and that is what must determine how they are to be used—then they will get good results, but it is too easy to overdo the prize idea—to have the man's idea so concentrated on the prize that he is going to get that he will try to conceal and cover up the things you are seeking to have foremost in his mind.

Chairman Palmer: You spoke about covering things up. That came up once before as an objection to offering prizes. If the prize is given on lost-time cases, and they should not be given, in my opinion, on anything less than a lost-time case basis, I do not see how you are going to run a chance of covering anything up. I know that from having some personal experience in accident prevention work in one of the large plants around Pittsburgh. They had, after two years, reduced their accidents almost 50 per cent, and by introducing the prize system the following year they reduced their previous record by 60 per cent. I agree with Mr. Young of the Illinois Steel Company that we have to use discipline, but I believe also that the combination of the two systems is better than trying to rely on the individual.

Robert H. Shaw: I wish to speak about the value of the shop magazine. We have had a little folder for probably a year and a half, and it has gone out with the pay envelopes. It is something that the men would take and put in their pockets, when they count their money, and when they were on the car they would naturally read this folder.

Regarding suggestions: The suggestions are sent in and they are divided. As far as I know we have never given any prizes. If any of the men makes

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a suggestion regarding "Safety First" work it will be taken care of. If they send in a great many suggestions they will be taken care of, perhaps, in the way of promotion. Men will naturally work themselves up.

The giving of prizes is new to me, and I am very much interested in it. I do not believe in it. I think that "Safety First" work is something that a man should be interested in. If a man makes a suggestion that is going to save a man's fingers or his life, why shouldn't he be interested and go home with a big heart that night and tell his wife all about what he has done?

John S. Rockwell (Buffalo, Rochester & Pittsburgh Railway): We have on our road, at every shop point, a first-aid team trained by surgeons. This year we have held our third annual meeting. The winning team this year was given a medal by the company, a medal by the American Red Cross, and, as a further prize, we gave them a trip to this Council. The second and third teams received certificates. We find that the organization of first aid teams, and especially of the contests, has done much for safety on our road.

We also have a very interesting magazine, published about four times a year. We call it an employes' magazine, and it is given to every man with his pay check. It contains articles by employes themselves, as well as others on the question of safety, and all matters of interest to operating men.

J. C. Smith (Inland Steel Company): We have been getting out bulletins for over four years. We started out in a small way with a four-page bulletin, which does very well for a small company. In fact, I know of a number of small companies who are getting out weekly and monthly four-page bulletins, which are very interesting and very effective. Our bulletin is a larger affair. We print 5,000 copies each month, and we have about 400 on our mailing list. One of the first things to consider in connection with the bulletin is its size. We believe a safety bulletin should slip into a man's pocket easily. Our safety bulletins are 6 by 9 inches.

The aim of a bulletin should be not only to promote safety, but take in subjects of promoting loyalty, education and health conservation. I have found that the men want other things in the bulletin besides safety work, and I believe in giving them what they want. On the cover of our bulletins we put, as a general rule, some illustration. In a good many instances we put a certain illustration and put the foreign languages below these illustrations, giving the six languages which are used by the majority of the foreign element in the plant. We generally run an editorial on some certain subject, such as "Loyalty," or "Minute Men of Safety." One page we devote to our mines, and we send this bulletin to the mines in addition to the steel mills. We have one page to cover accident-prevention work, giving the causes of accidents and their prevention. Another page on illustrated accident prevention and articles by the superintendents on that subject. We have a cartoonist at the plant. He is the timekeeper, and he gets up cartoons; not funny cartoons, but those that point their lessons. The bulletin costs from $150 to $250 a month for 5,000. One good idea for a small plant, and I presume most of the people here represent the smaller plants, is to get out a little bulletin on a card representing a safety bulletin board; put your illustrations on the front and a little article on the back.

Regarding prizes: We give out seven prizes each month for the best safety suggestions. We give a gold watch—a 23-jewel watch, with an emblem on the back—as first prize. We have increased our safety suggestions 1,200 per cent each year since we started to give these prizes, and I believe that shows it is worth while. We get some very fine suggestions, and I think that everybody here can well afford to try it out—the idea of the prize system for accident suggestions.

Chairman Palmer: We have heard some very instructive suggestions, and I am sure we can carry them home and make use of them.

H. W. FORSTER, CHAIRMAN

Chairman Forster: Our secretary suggests that anyone present who de-

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sires information on the subjects under discussion today can get a good deal of specific information by writing him at Chicago. That is what the Council renders in the way of service.

You have on your program an announcement that the "Super-Six" chairman, as our friend Lew Palmer so gracefully put it—"Super-Six" means "over six" feet high—is going to talk for ten minutes on "Home Safety," but he is not going to do anything of the kind. He is going to call on various members here to express their ideas on various subjects of interest.

George T. Fonda: One or two members have distributed their used bulletins to the schools. It seems to me in this connection—and this is sort of submarining the issue, because if they would go one step farther and take those bulletins; many of them have colored pictures, and we know what childen think of colored pictures—by taking the bulletins and, perhaps, giving them to the children in a class, for instance, that had the best deportment, or something of that kind for the week, and letting them take them home, it will make an inroad into that home. I think it might be of some help.

J. G. Hatman: In connection with the suggestion about carrying them to the schools, if the safety engineer will go to the school himself and give a little talk occasionally, he will arouse more interest than all the magazines and bulletins that you might send. Some time ago we secured a set of lantern slides, and I gave personal talks to our men at both of our plants and showed them these slides. That aroused all of the men and had a wonderful effect.

Isaiah Hale (Santa Fe Railroad): In the last four months of the last school year, I talked to every school class above the fourth grade in every town of any size along our line between San Francisco and Chicago, with the exception of Kansas City. I don't know how many children I addressed, but probably 350,000 or 400,000. In return I received something like 1,100 letters from boys and girls telling me how this message struck them. If we are going to get it into the home, I don't know any better way to do it than through the school.

Mr. Rider (Chicago, Milwaukee & St. Paul Railroad): That is the way I reached a number of people along the line of our railroad—by going into the schools and talking to the children. The message has been carried home by the children. The superintendent of schools at Omaha gave me two hours one afternoon on the last day of school. The teacher said: "What business has that fellow to step in here and interrupt our program for the last day of school? We have a different program arranged; we want to see it carried out." After I got through talking the teacher said: "We think that your work along the line of safety to the children—and the message which will be carried home—is of more value than all the program we had mapped out."

Alexander Fleischer (Metropolitan Life Insurance Company): We are talking to about 10,000,000 people each week on health. The basis of our campaign is, as you know, through our agents, who reach these people. We distribute literature, but the important point in the printed page has been in the simplicity of wording and in the brightness of the colors in all the literature that we have gotten out. In our attempt to reach the children we have gone one step farther. We have secured a novelty in the form of a safety booklet, the pictures in which were drawn especially for us, with a little red skeleton which completely changes the picture. In the first form it shows things that the child should do, and when that red skeleton is placed over the picture it shows the things that the child should not do.

F. W. Shepard (Birmingham): I believe an ideal, cheap and easy way to reach the home is through the newspaper. Nearly every one takes a newspaper of some kind. If you have some safety slogan at the bottom of a picture and put it in the newspaper—any of the newspapers will be very glad to give you space—in that way you can reach the children easily and cheaply. It does not make much difference what the caricature is—you can use almost anything you want to. You know a child looks for the pictures first, and when the paper

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comes the first thing the child wants is the funny page.

Dr. A. M. Harvey: Two years ago some of the members of the Chicago Local Council conceived the idea of holding a "Safety First" day in one of the suburban towns. We engaged a moving picture theater. We completed arrangements with the public schools and the parochial schools. They divided their classes so that we had one show in the forenoon and two in the afternoon. We also had a show in the evening for the adults. We not only had the moving picture show, but had different speakers at all of these meetings. In this little village we reached over 2,500 people. The impression gained was lasting. The school children wrote essays upon "Public Safety" and "Industrial Safety." The Illinois State Medical Society, at its annual meeting, conceived the idea of holding a "Safety First" day under the direction of the public policy committee. The first meeting was held at Springfield, Ill. Speakers were provided, moving pictures were secured and the meetings were held in the armory. The street railway worked out a scheme and transported all of the school children to the armory free of charge. In addition we had meetings of adults in the evening. I understand something over 10,000 children were there. We have continued that each year, wherever we have gone with the annual meeting.

The meeting adjourned.

Maximum Temperature in Which a Workman Can Work

To the Editor of Safety Engineering: What is the maximum temperature in which a workman can work without undue discomfort or injury to his health? It is a question of attempting to get as high a heat as possible in a dry room, using heated air and necessitating the presence of a workman to handle the material.

[At the request of SAFETY ENGINEERING, DR. FREDERICK L. HOFFMAN, statistician of the Prudential Insurance Company of America, has consented to give our readers the benefit of his investigations on this important subject.]

IN the first place, I assume that your question is limited to the qualification as to the extreme heat possible in a drying room in which heated air is used and in which workmen are required to handle materials. Perhaps a typical illustration would be the drying room of a linoleum works, in which practically all the moisture is extracted from the atmosphere and in which, as a consequence, acrolein is developed, which is considered more or less injurious to health. Thus, extreme heat and extreme dryness may be complicated by chemical factors, even more injurious than dry heat itself. Of course, extreme heat coincides with extreme atmospheric dryness, which, as such, is injurious to health. It is usually considered that a humidity of less than 30 per cent is injurious to the human organism.

The second question is the degree of continuous exposure. Mere heat exposure, especially radiating heat in front of furnaces, even though over 2,000 degrees F., is not seriously injurious, in that it is rapidly disseminated and felt at most only by the front surface of the body for a very short period of time. Such heat exposure obviously does not require consideration in answer to the question.

The third factor, and perhaps the most important, is bodily exertion under extreme heat accompanied by extreme dryness. Such bodily exposure is much less trying under extreme dry heat than

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under extreme degrees of atmospheric moisture accompanied by relatively high, but not abnormal, temperatures.

According to the most recent treatise on "The Diseases of Occupation" by Kober and Hanson, "exposure to dry heat for a short period is sometimes borne without serious effects in temperatures as high as 140 degrees or 150 degrees F., provided the air is kept in motion." This condition, of course, is radically different from excessive temperature exposure on the part of puddlers and electric furnacemen, who, for a very brief period, may be exposed to temperatures of 212 degrees F., etc., without serious injury. I am inclined to think that a radiating temperature may very materially exceed this figure without serious bodily injury, even though burns may be caused, which usually are of less consequence. It is said in the work referred to that "prolonged exposure, however, is usually followed by grave constitutional disturbances; these need not to be gone into." It is also said that "the men engaged in handling molten metal and all others exposed to radiant heat not infrequently suffer from dermatitis, an inflammatory condition of the eyes, and even cataract, induced by the partial dehydration." This, in fact, is perhaps the most serious effect of extreme heat endured for a short period of time, but at frequent intervals.

The most scientific treatise on the subject is an address on "The Effects of Exposure to Intense Heat on the Working Organism" by Surgeon Charles N. Fiske of the United States Navy, published in the Transactions of the fifteenth International Congress on Hygiene and Demography. Most of the observations have reference to heat affections in the navy, but they may possibly be more applicable to the question than information derived from other occupational experience. Referring to the temperature of the berth accommodation on the *Marblehead,* which was from 90 degrees to 92 degrees F., it is said that this heat rendered it almost impossible to obtain refreshing rest. The fire room, however, had a temperature as high as 140 degrees and it is said by Dr. Fiske that he, himself, had observed a temperature as high as 186 degrees, but that the average was 120 degrees and in the engine-room from 105 degrees to 110 degrees. Under these conditions, however, work was considered endurable and no very serious cases of illness were experienced.

On submarines, under conditions of active service, equally high temperatures, if not higher, have been endured without fatal results. One of the best authorities on this subject is Prof. Frederic S. Lee of Columbia University. He directs particular attention to the importance of air movement as separate and distinct from mere heat and humidity. He remarks: "In proportion, however, as the temperature of the air approaches or surpasses that of the body and the humidity of the air is sufficient to prevent the evaporation of sweat, loss of bodily heat by the customary channels becomes lessened. Without adequate means for eliminating the heat that is being constantly produced within, the internal temperature rises and a febrile condition results. Such a state is reached the sooner the more mechanical work is performed and the more heat is thereby produced. Its oncoming is favored also by a lack of movement in the air. With a continuance of the unfavorable environmental conditions a simple rise of internal temperature may pass into a higher fever characteristic of simple heat prostration, or a moderately severe heat stroke with a temperature up to 40.6 degrees C. (105 degrees F.), and finally into the hyperpyrexial or intense form of heat stroke, in which the bodily temperature has been known to rise to the phenomenal height of 47.6 degrees C. (117.8 degrees F.)."

I am of the opinion that the best practical information can be obtained from those in charge of linoleum works. Certainly in my own experience the temperature conditions there were the most trying of which I have knowledge. They do not compare with, but are in contrast to the excessive heat experienced in the lower levels of the Comstock Lode. A comparison really is difficult, if not impossible, for totally different bodily effects are experienced. In the Com-

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stock Lode the air suffers also chemical contamination, as is the case in the drying-rooms of linoleum works.

In my investigations at steel plants I do not recall excessive temperatures much over 120 degrees, as far as actually determined. The enormous heat inside the furnace may be over 2,000 degrees, but it dissipates so rapidly in the general atmosphere that, as shown by the government report on labor conditions in the iron and steel industry, it rarely, if ever, exceeds 147 degrees, which was ascertained 12 feet away from the tap-hole of a furnace. Such a heat, of course, does not affect the body as a whole,which can only be said to be the case in a close compartment, such as the drying-room of a linoleum plant or the engine-room of a submarine.

It is stated by W. Gilman Thompson that the oil mixture in linseed manufacture is heated to approximately 450 degrees, during which process certain fumes are evolved. This temperature, however, has no reference to the heat conditions in the drying-room. In linseed oil manufacture the substance is mashed and pressed to a temperature of 125 degrees, but whether the men are exposed to this heat for a sufficient length of time to be injuriously affected, is not made clear by the available discussion. It is said that the workmen are protected from the excessive heat by draughts of compressed air.

According to an investigation of my own made quite a number of years ago, the temperature in drying chambers at linoleum plants may be raised as high as 180 degrees, but this temperature may possibly not prevail when the rooms permit ingress and egress on the part of the workmen, while placing in or taking out the rolls of linoleum. Of course, the time exposure on the part of these men is relatively short and I do not wish to be understood as maintaining that the work as such is seriously injurious or exactly proportionate to the degree of temperature exposure for a very limited period of time. The effects of sudden and radical temperature changes may, in the long run, be more seriously injurious to health than short-time exposures to high temperature, even though the latter are experienced at frequent intervals over comparatively long periods of time. This, however, is debatable.

Pennsylvania Railroad's Record

IN 1916, the Pennsylvania Railroad system carried in its trains more people than in any previous year of its history, and did so without losing the life of a single passenger in a train accident of any kind.

Statistics, which have recently been compiled, show that during the year there were transported safely, on the lines east and west of Pittsburgh, 196,-294,146 passengers. Figures for the last few weeks of the year are necessarily partly estimated. The heaviest freight traffic ever handled by the Pennsylvania system was moved over its lines at the same time that these passengers were carried without loss of life.

The entire Pennsylvania Railroad system, taking into account every affiliated company either east or west of Pittsburgh, now has to its credit three full calendar years in which no passenger has been killed as the result of a train accident on any portion of the lines. During this period 553,890,063 passengers—equal to five and one-half times the population of the United States—have been safely transported a total distance of approximately fifteen billions of miles, or 150 times as far as the sun is from the earth.

Upwards of 9,000,000 trains, carrying both passengers and freight, were operated by day and night, through sleet and storm, fog and sunshine, over 12,000 miles of railroad line and 27,000 miles of track, while these passengers were being taken on their journeys without loss of life.

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The Trainman's Hand Lantern

By W. S. Topping

Bureau of Explosives

From Second Quarterly Bulletin of the Railway Fire Protection Association

IN the December issue of the Railway Fire Protection Association's Bulletin Mr. Robert Scott called attention to the necessity for a searching investigation into the origin of every fire regardless of its proportions. A recent compilation made from the records of the Bureau brings forth most emphatically the facts with regard to the fire hazard connected with the ordinary use of a trainman's hand lantern. This hazard, so far as these remarks are concerned, is considered in relation to the ignition of inflammable vapors arising from leaking liquids. Ignition of such vapors usually results in a more or less serious fire, and if users of these hand lanterns can be reached and taught the reasons why a lighted lantern can cause serious trouble, it is believed the results will justify any means that may be taken in this direction.

Practically all of the oils with flash point below 200 degrees F. permit the formation of vapors that may be easily ignited by a flame, but oils or liquids with flash points below 80 degrees F. possess in a greater degree these dangerous characteristics. For example, alcohol, if leaking from its container, in a car or warehouse wherein the temperature is about 60 degrees F., will vaporize and the vapor is easily ignited—gasoline at a temperature of 0 degree F., whiskey at 81 degrees to 85 degrees F., turpentine at 105 degrees F., kerosene at 115 degrees to 130 degrees F. Oils with even higher flash points will form vapors that are inflammable even though the temperature of the storehouse or car is considerably lower than that of the liquid, and the use of a lighted lantern provides a ready means of ignition.

The presence of a glass globe surrounding the lighted wick of a hand lantern does not prevent the flame from doing its work. The vapors reach the light in the same manner that the oxygen from the air enters the lantern to support combustion.

Inflammable vapors are usually heavier than air and in a closed car or warehouse will be found along the floor. Instances are recorded where barrels of illuminating oil and gasoline were in leaking condition in a car and a hand lantern was set upon the head of a barrel, but when the lantern was moved to the floor of the car immediate ignition of the vapors occurred.

Empty tank cars that have contained oils present a dangerous condition when the open dome is approached by a man with a lighted lantern. Many accidents have occurred due to the use of a lantern for the purpose of ascertaining whether the tank was empty or filled. While, as a rule, such accidents do little more than cause severe or fatal injuries to the employe involved, they may be the cause of serious fires.

Leaking receptacles of any kind should never be approached with any exposed flame, such as a torch or lantern. *"It is better to be safe than to be sorry,"* and usually the person is sorry after the natural result has followed his careless action.

The following few instances where investigations showed that the ignition was caused by a lighted lantern will serve to indicate the results that are to be anticipated:

Alcohol. Leakage from barrel, property loss	$7,313.00
Cement (Leather). Leakage from screw-top can, 23 box cars and part of platform destroyed, 1 man burned, property loss	65,000.00
Gasoline. Tank car leaking, employe approached with lantern, 1 killed, property loss	1,544.00

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Gasoline. Tank car in derailment, 1 burned to death, 4 injured, property loss	$4,351.24
Gasoline. Two drums in warehouse, leaking condition, 3 men burned, property loss	584.39
Gasoline. Tank car being handled with dome cover off, trainman on top with lighted lantern, ignition of vapors, man burned, property loss	1,000.00
Gasoline. Draining automobile in freight warehouse, 2 burned, property loss	4,235.00

The regulations covering the transportation of explosives and other dangerous articles are prescribed to provide safety to the traveling public and to prevent fires and loss of property and life to carriers and their employes. These rules prescribe with definiteness certain things that are *not* to be done by railway employes. One of the most important is the caution, "Keep Lights and Fires Away," which is placarded on every car containing an inflammable liquid in quantity. The packages themselves bear a similar caution, but it seems quite difficult to impress on the minds of railway employes the fact that a hand lantern is a "light" and as such is to be kept away. So many serious accidents and fires have resulted from failure to observe this caution that it is deemed a proper subject for special attention and instruction. Every man connected with the transportation service to whom a lantern is furnished could be given a card bearing a picture of a lantern and these or similar instructions:

"SAFETY FIRST"

(Lantern)

DO NOT lower a lighted lantern into tank cars!

KEEP AWAY from domes!

DO NOT carry into box cars full of inflammable vapors—your nose will tell you of their presence.

NO NOT use under or near cars from which inflammable liquids are leaking!

KEEP AWAY from wrecked cars placarded "Inflammable"!

KEEP AWAY from leaking drums, barrels or other packages bearing RED labels!

"PREVENT FIRES"

In the investigation of fires, when the facts as developed show that a fire has been due to failure on the part of an employe to obey proper cautionary rules, an opportunity is afforded the railway official to utilize such information along educational lines for the benefit of other employes. *Fire Prevention Pays.*

Overalls for Women in Industry

ONE hundred girls and women of the H. D. Lee Mercantile Company, employed in its garment factories in Kansas City, have recently been clothed in overalls, as a precaution against accidents. The women remove their street clothes on arriving at the plants, and put on the overalls, which are loosely made, but of the ordinary bifurcated style. The plan was adopted on the suggestion of R. B. Jones & Sons, insurance agency, of which the Lee company is a client. Much publicity is being given in Kansas City to the subject of overalls for women in industry.

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Fatality Rate in the Explosives Industry

Statistics That Show Efficient Work for Safety

THE table shows the fatality rate in all plants operated by E. I. duPont, deNemours & Company from 1908 to 1916 inclusive. The average number of employes is based on the number of "full time" employes, which is practically equivalent to the basis of "300-day workers" used by the United States Bureau of Labor Statistics.

The number of fatalities includes all that resulted from accident in the course of, or as a result of, the employment.

The figures for the years 1915 and 1916 are particularly interesting, for though the number of employes was multiplied by 10 in these years, there was comparatively little increase in the fatalities per 1,000.

If consideration is given to the great number of new, inexperienced and often ignorant employes; the number of new men on the staff required to supervise them; the very great amount of construction done under high pressure; the adoption of new processes and the great expansion of old processes, safety engineers will probably be of the opinion that the record is one in which the explosives company may take pride.

It is not probable that the fatality rate shown by the E. I. duPont, de Nemours & Company's plants will suffer by comparison with similar statistics from other groups of equally hazardous industries.

The explosives industry is commonly believed to be exceedingly hazardous and its accidents are given wide publicity in the daily press, but are often exaggerated. The figures given in the table, when compared with other figures that have been made available through the United States Bureau of Labor Statistics, tend to indicate that the explosives industry is not by any means as hazardous as is generally thought. Furthermore, the figures show that E. I. duPont, deNemours and Company in their consistent efforts for greater safety have met with a remarkable measure of success.

FATALITY STATISTICS OF E. I. DUPONT DE NEMOURS & COMPANY—1908 TO 1916 INCLUSIVE.

Year	Average Number of Payroll Employes	Number of Fatalities from Accident	Fatalities per 1,000 Employes
1908	3,817	35	9.17
1909	4,647	25	5.38
1910	5,466	31	5.66
1911	5,241	17	3.24
1912	5,391	11	2.04
1913	4,659	22	4.72
1914	4,109	7	1.70
1915	46,475	95	2.04
1916	49,326	120	2.41

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National Safety Congress 1917

American Museum of Safety and National Safety Council to Hold a Conjoint Exhibit of Safety Devices

THE National Safety Council will hold the Sixth Annual Safety Congress in New York City commencing Monday, September 10. A date in early September instead of in the latter part of October, as heretofore, is far more convenient for everyone interested in Industrial Safety, Sanitation, Welfare and Fire Prevention.

In bringing the Congress to New York City for 1917 the executive committee of the National Safety Council has made a wise decision. It was in the Hotel McAlpin, during September, 1913, at the convention of the Association of Iron and Steel Electrical Engineers that the National Safety Council was born as an independent association under the name of the National Council for Industrial Safety. That event is one which will always closely associate the National Safety Council with New York City. It was on September 24, 1913, that President Campbell announced that the National Council for Industrial Safety was an accomplished fact and on that date he outlined its plans and ambitions which have been splendidly realized, far exceeding the expectations of those who outlined the plans for the National Safety Council. To one who has attended each convention since 1913 the strides this now great association has made are most impressive. From a few hundred the attendance has grown to thousands, and there is every reason to believe that the 1917 convention will show greater progress than any previous one.

New York City has another great claim as a safety center of this country in the American Museum of Safety. This institution was established before the National Safety Council, as a museum for exhibiting devices that are needed in the industries for preventing accidents and securing safer conditions for life and property. This is the foremost institution of its kind in America and for a number of years has held, annually, a comprehensive safety exposition which has been a powerful force in acquainting employers with what they need to prevent accidents.

The American Museum of Safety and the National Safety Council have concluded arrangements whereby these national safety institutions will hold a conjoint Safety Exposition. The great Safety Exhibit made possible by the co-operation of the two bodies is to be held in the Grand Central Palace, the largest exposition hall in America. Officers of the American Museum of Safety and of the National Safety Council are to be congratulated upon the wise policy of working together at an opportune time to spread the gospel of safety, by providing for those who attend the Congress an immense exhibit of the progress that has occurred during the past year in the safety field by means of which all practical means for safeguarding life and property may be studied.

Fire Protection for Theaters

RICHARDSON THEATER, East First and Oneida streets, Oswego, N. Y.

The basement of this theater has been recently equipped with a 4-inch standpipe extending to exterior of building, having a siamese connection with check-valves, to which pipe are attached ten 1-inch Bresnan revolving distributing nozzles. Above the scenery over the stage there has been installed in addition to the sprinkler system, an

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automatic circular distributing 3-way nozzle, having a capacity of 1,150 gallons of water per minute under 120 pounds pressure, which nozzle is attached to a permanent 4-inch standpipe, extending to the exterior of said building, to which is attached siamese connections with check-valves. Above the ceiling of this theater there has been placed an automatic solid double stream circular distributing nozzle, throwing two 1¼-inch solid streams, and having a capacity of 620 gallons of water per minute, under the pressure above stated. This nozzle is supplied by a separate standpipe, similar to the nozzle over the stage. The lath in ceiling have all been covered with two heavy coats of magnite, a fire resisting paint. The timbers have all been covered with asbestos paper. Many hundred pounds of galvanized iron have been used to cover floors, stairways and sides of stage to prevent the possibility of ignition by a carelessly discarded cigar or cigarette. The building has been provided with a permanent iron fire-escape, through which there extends a 4-inch standpipe extending to the roof, having siamese connections with check-valves at ground and on roof, which standpipe has openings with gate-valves opposite windows upon 3 upper floors. The sprinkler system is connected to the city fire department by an automatic city alarm, and there are 7 fire alarm boxes situated throughout the premises. The building itself is 4 stories in height and of brick construction, and is occupied by restaurant, cafe, society and lodge rooms, offices, storerooms and theater.

Please Do Not Cough!

By GoodActive

YOU thereby spread the habit among children and other weak persons.

The habit is a bad one, because thereby you hurt the healthy aura around the child's or weak person's throat, chest or belly—you destroy the healthy quality of the aura. Yes, indeed, any other part of the body vitality may be destroyed by a merciless cougher.

Coughing can be avoided by one who is conscious of its destructive effect and the impoliteness thereof. Some people cough when they hear a mentalopathic word, which is as bad or worse than to feel concerned and cough because you hear people's voices in an adjoining room; or because you hear a group of people converse when you pass on the sidewalk.

It is better to look pleasant and smile, even if your quiet thoughts should be a little disturbed when you pass; and the same way when you hear a mentalopathic word; or when you strike a thought wave which is unknown to you. You will look more pleasant, and be given more consideration yourself, and you will have the good conscience of not having disturbed others and given them a bad example.

You would not have a stranger come around and cough because you were conversing with a friend, or because you were busy thinking out a problem or otherwise legitimately active.

The hope of many poor victims of consumption is to forget all about the ailment and be happy in their daily life. Those most seriously concerned are always reminded of their disease by a thoughtless big cougher who practices fancy or non-fancy coughing for a sort of shake-'em-up effect and so they are prevented from growing new health and flesh.

The so-called shake-'em-up cough, of course, is designed to disturb others' nervous system—think of it! Just as if your own circumstances were not trying enough on your nerves.

If it is a matter of spreading lung, belly or throat disease or "colds," then it is plain that it is worse to cough out the "germs" in the air around a nearby person than to spit on the sidewalk. When coughing the disease out into the air, they are liable to be direct-

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ly inhaled by another's breath, or to come into his eyes and face, which is worse than if they clung to the shoe soles.

A pressing cough caused by a tickling or irritated throat, is generally easily avoided in various ways by good thought play, conversation or by repeating some pleasant words by oneself, a little whistling or singing; by taking a drink of water, etc.

Many a youth and maid who think they have to practice coughing thereby destroy their lungs and health.

Do you notice that some men every morning in the toilet try very seriously to cough up their stomach? This is an exceedingly silly habit, and it annoys those who try to get their beauty sleep. If one feels the necessity of some exercise, why not take some gymnastics. Then you fix yourself without disturbing your room or flatmate.

Coughing represents bad temper, ignorance and sickness and should therefore not be practiced thoughtlessly by any one.

Gas Tank Explosion in Kansas City

CANTILEVER floor construction, windows filling space between floor and ceiling and 9-foot sheets of plate glass, concrete floors and walls, were the chief factors that prevented a disaster in Kansas City when a natural gas tank exploded on January 16. The tank was used in the plant of the Meyer Jewelry Company, manufacturers, on the fifth floor. The tank that exploded was not a regulation tank for compressed gas. It is believed to have been filled with natural gas that was not pure—experts testifying at the inquest that Kansas City natural gas has much air, and is dangerous to use under compression. The tank had backfired the previous Sunday, and the men had orders to leave it alone. January 16, H. C. Kollman, manager of the Kansas City Calcium Light Company, that filled the tank, came to repair it, and while he and Harry N. Snow, superintendent for the Meyer Jewelry Company, were standing by the tank it exploded, killing Snow and fatally injuring Kollman. Only one small piece of the tank was found. Only a small fire with the loss of a few dollars resulted.

The explosion knocked down several people, burst out all the windows on the fifth floor and several windows on the sixth and fourth floors, the expansion reaching these floors through stairways and elevator shafts. Small fragments of glass from the windows injured many people in the street below.

The building was planned by Louis Curtiss, architect, of Kansas City, and was built by Martin Carroll. It is 6 stories, designed for 15 stories, 96 by 130 feet, concrete. Pillars and beams are 8 feet from the building line, each floor being cantilever construction. The walls are plate glass for the entire 12 feet, set in cast iron frames, large sheets being 9 feet square, and smaller sheets 2 feet wide where hinged casements allow opening; panels of about 3 feet vertical measurement are below the large panes. The explosion shattered the glass, which fell in small fragments, causing no serious injury to people in the street and sidewalk. Where narrow casements caused greater resistance, mullions were bent outward in some cases.

It is said that walls of brick and smaller windows, would have been blown out, with serious damage to pedestrians, and, possibly, the destruction of the building.

This building, with its broad glass exposure, has gone through winds of 100 miles an hour without injury, since it was erected in 1911.

The local safety council at Kansas City is arranging for the introduction of ordinances that will provide inspections of compressed gas tanks similar to that required by the Interstate Commerce Commission on such tanks for shipment on interstate roads.

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Hints for Industrial Safety Work

By F. M. Coffey

State Commissioner of Labor, Nebraska

Address at a meeting of the Omaha Local Council, National Safety Council.

THE increasing danger of life and limb involved in the pursuit of industrial occupations has become so great that the necessity of doing everything feasible to keep it within the narrowest possible limits is clearly evident. Articles are being manufactured in greater numbers and variety than ever before in the world's history. More and more machinery is constantly used, and more and more persons are employed in factories, mills and workshops.

The toll of human life and limb exacted by modern industry has reached such startling proportions as to be a serious menace to our national welfare. That it is so recognized is evidenced by the increasing number of laws made to protect life and health, and the marked tendency shown to fix the legal responsibility for accidents.

Investigation into the causes of this drain upon our national vitality has proved conclusively that a large percentage of industrial accidents can be avoided by the adoption of proper preventive measures. From the nature of the case, it is plain that, although employer and employe must work together to attain the desired end of reducing accidents to a minimum, the initiative should come from the employer.

The "Safety First" agitation of recent years has borne good fruit as is shown by figures given out by the Federal census department for 1915.

In 1913, 54,011 deaths were reported as due to accident. In 1914, the number was reduced to 51,777, and in 1915, to 51,406. During this period there was an increase in the population of the district from which tabulations were made, and the district itself was enlarged. The rate per 100,000 population for accidental deaths fell from 85.3 in 1913, to 78.5 in 1914 and to 76.4 in 1915. During the same period of time there was a reduction in fatalities due to railway, street cars, mines and machinery accidents.

Deaths caused by machinery accidents in 1915 numbered 1,257 or 1.9 per 100,000. These figures show a marked decline. The figures for 1913 and 1914 were 2.4 and 2 respectively. The highest record rate from this cause in the district is 2.5 for 1907. It must be understood that these tabulations are made from a district comprising only those States which provide adequate and reliable methods of reporting accidents.

The safeguarding of dangerous machinery and places, and the education of the workmen along safety lines are universally recognized as the two most important factors to be considered and given attention if any accident prevention campaign is to be successful.

It is plainly evident to most persons that if the installation of safeguards be carried out to the highest point of efficiency and workmen are careless, many accidents are sure to occur. Conversely, if workmen are thoroughly alive to the need of doing all their work in a careful manner, and earnestly strive to do it so, accidents will yet happen in large numbers if necessary safeguards are not installed.

A study, however, of a number of accidents scattered over an area of diversified industries, shows conclusively that a combination of education by means of safety meetings, posters, bulletins, contests, etc., and by means of the installation of safeguards cannot help but bring results, as most accidents are caused by conditions which would not exist if a system of both education and safeguards were used.

The experience of employers, as noted in the statistics, who have taken up phases of both education and safeguards and have carried them out in an efficient manner justifies the statement that edu-

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cation brought about through safety meetings has proven a most valuable means of reducing work accidents. Education probably plays the more important part by far.

Owing to the constant change of workmen in any establishment it is sometimes difficult to reach every new employe within a reasonable length of time. The fact remains, however, that if there has been a proper effort along safety lines and the general need and necessity for safety has been instilled into the workers, it will take only a short time for the new employe to be permeated with the same feeling, or else the attitude of the other employes will force him to find more congenial surroundings.

Work accidents will never reach a minimum in any establishment in which the official heads say, "We want a safe shop," then turn to their lower officials or foremen and say "We want production at any cost, and we don't care how we get it." In such an establishment accidents are bound to continue and the possible minimum will never be reached.

An efficient safety organization along educational lines which receives official recognition will prove to be the most important means of obtaining the safety spirit in employes. It will grow and increase in benefits as it receives persistent and earnest support if the management has shown its worth. The first essential in safety education is to keep the place of work in a safe condition. Many different plans have been suggested and tried, but they frequently grow stale after a time and the employes lose interest.

The following plan is suggested which would seem to be successful in obtaining the help and co-operation of each employe in promoting safety. It is also a means of stimulating the minds of the workmen to think about safety at all times. This plan has been tried out in some establishments and has proven quite successful.

Place at permanent and suitable locations throughout the plant a suggestion box fitted with lock and key in which employes may deposit slips on which they have written suggestions for improvements or changes which, in their opinion, would better conditions. A notice might be posted, reading as follows:

"EMPLOYES.—Your health and safety are your greatest assets. We wish to protect them. Will you? Report immediately on the slips provided all unsafe, unsanitary or unhealthful conditions in this plant. Place slips in box. They will receive careful consideration."

Blank slips may be placed at convenient points in the plant upon which suggestions can be written. The employe should be given to understand that suggestions from him are not only invited but solicited and will not be considered in the nature of faultfinding or "knocking." Frequent joint meetings of employes, including foremen, superintendents and officials, should be held at which suggestions may be discussed and conclusions reached. A public bulletin board can be used to good advantage in giving information regarding safety suggestions. Not only may suggestions be received for making the shop safe but a plan may be devised for better working conditions, increased production, or anything else that will increase efficiency. It is the wise employer who realizes that he can learn much to his advantage from the man who works for him, and this method of stimulating the worker to think for the mutual advantage of all is a practical one; one which can also be instrumental in promoting more personal relations between those in authority and those who work under them. Such relation might help to solve many of the labor problems.

These suggestions are deemed pertinent and of value in placing the number of work accidents at the minimum in any given establishment.

Foremen are such essential factors in the prevention of accidents that they should be carefully selected for their caution and ideas of discipline. They should be thoroughly imbued with an earnest desire to prevent accidents. When men are first put to work at dangerous machines they should be fully instructed how to operate such machines with the greatest safety to themselves and others.

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Slow-thinking, heavy men should not be assigned to tasks requiring quick thought and bodily agility. Men who have a habit of getting hurt should be put on jobs where they are least likely to be injured.

Cordial co-operation of workmen with their foremen and with each other will do much toward accident prevention. One man's effort to promote safety may seem small, but the sum of the united efforts of many will be large.

The employment of young persons to do work for which they are not physically nor mentally qualified should be avoided.

Every effort should be made to have plenty of room about machines. Where there cannot be ample room, safe passageways should be railed off.

Plenty of light should be provided—artificial when natural is not available—as good light is especially necessary.

It is important to keep the plant well cleaned up. Stock and finished products should not be allowed to fill up the space left free about the machinery. Waste material should not be left on the floor.

Every machine should be safeguarded, and the best time to safeguard a machine is when it is built.

To get the best results from safety devices their use in their entirety should be insisted upon.

Warning signs, judiciously used, will tend to prevent accidents as they are a constant reminder that danger does exist. They should always be backed up, however, by supervision and enforcement.

Careful inspection of all machinery and structures, in fact of the entire plant, will prevent many accidents by discovering defects and dangerous conditions due to wear and other causes.

Before beginning work a man should examine the machine, tools, apparatus, etc., which he is to use and the safeguards for them. If they are not in proper order he should report their conditions to the foreman—not starting work until defects have been remedied.

All workmen should be required to wear tight fitting clothing. Dressing or undressing, or storing of clothes in close proximity to moving machinery, should be prohibited at all times.

Unfinished or finished material should be piled on a good foundation and in such a way that the pile will not topple over nor parts of it slide off the top.

Trucks should be carefully loaded, and in no instance overloaded.

A good blower system conduces to safety both by diminishing the likelihood of fire and by preventing injuries caused by flying chips.

The use of motor drive largely reduces the probability of accidents both directly and indirectly. Its elimination of much shafting, belting, etc., makes the room lighter, cleaner and more roomy.

Every factory should have a sufficient number of exits and fire escapes to permit prompt egress and no exit should be allowed to be even temporarily blocked.

Every injury, however slight, should be reported at once to the foreman. No injured employe should be allowed to continue to work unless his wound has been properly cleaned, dressed and protected by a bandage to prevent dust and dirt from getting into it.

The total number of work accidents settled under the Nebraska compensation law for the eleven months commencing January 1, 1916, and ending November 30, was 5,411. Classifying these work accidents under the various headings as indicated by the face of the report of each accident, 4,603 are found to be "Incident to Employment." Those cases in which it was impossible to determine from the face of the report as to fault, are listed as "Fault Not Placed," 552 in number. In 66 cases the face of the report showed "Negligence of Employe." There were 40 cases in which the fault seemed to be that of "Negligence of Employer." In 142 cases the fault was that of a "Fellow Servant." In seven cases there seemed to be negligence on the part of both the employer and employe. These were listed as "Comparative Negligence."

There are many work accidents which just "happen." It doesn't seem that anyone in particular is to blame. A thorough education along safety lines and the more general installation of

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safeguards and insistence upon their use will, without doubt, greatly reduce the number of work accidents which are said to be "Incident to Employment."

The Nebraska statutes contain a thoroughly adequate factory inspection law, but the legislatures of the past have failed to make reasonable appropriations for the enforcement of its provisions. The workers of Nebraska are entitled to safe and sanitary places in which to work. This may be brought about to a large degree by education and co-operation between employers and employes, but the State should not shirk its responsibility in providing adequate rules and regulations, and appropriations for the expense of administration.

Work accidents in an establishment cannot be kept at the possible minimum by the installation of hurry-up methods, stop-watches, stints and dead lines. The use of these methods of production in an establishment is not only conducive to accidents but prevents efficiency.

The "Taylorization" of production in an establishment is with the sacrifice of the health, life and limb of the worker and places efficiency at the lowest point.

The Inspector's Plea to the Mine Worker

By Sim C. Reynolds

Pennsylvania Mine Inspector, Aetna Life Insurance Company

IN the broad halls of industry both you and I have a definite niche to fill. Working apart, both of us in our own way, we can do much toward the fulfillment of our duty; working together, we can do vastly more. You cannot help me in all things, neither can I be of service to you in all things; for, while my mission is solely to look after your welfare, it stops at the physical. Your spiritual security is a matter that lies between yourself and your Maker. In your creed, color or political bias I am not interested; but your physical safety is my whole concern, as it must of necessity be yours if you would live and prosper.

To heal a wound, to soothe a pain, caused in the course of your daily toil, is work for other hands than mine. As for me, I must content myself when I have done my utmost to prevent a recurrence of that wound or pain. As the pilot guides the ship past dangers with which he, better than others, is conversant, so must I endeavor to guide you in the paths of safety through all the work your hands find to do. I peer into the darkness of the underground for dangers which may befall you. I test the wheels and vital parts of the machinery that drops you into darkness and that rushes you through the blackness, carrying you to your destination. It is my mission to seek therein for weaknesses and defects which may cause disaster, that you may rest in safety to your journey's end.

Yet, howsoever careful and conscientious I may be in seeking and removing these dangers of the underground, you have it in your power to undo much of my work. Without your co-operation much of the usefulness of my labor may be lost—and perhaps your life or possibly your happiness. I may throw a safeguard around the thing of steel which, unseen, may maim and kill, but at the best this is but partial security. To make it altogether safe I must have your help—your co-operation. With you, I can promise the limit of safety; without you, my work may be in vain.

Give me your assistance and encouragement while I work to ward off the dangers that everywhere beset you. Work together with me in an effort to remove those things that tend to make widows and fatherless children, and cripples and subjects of charity out of strong men.

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The Dangers of Infections

An Open Letter to Foremen

By George W. Bowie

Safety Inspector and Master Mechanic,
American Car & Foundry Company, Detroit, Mich.

[EDITOR'S NOTE.—*In a recent number of the American Car & Foundry Company's publication appeared an article by Mr. Bowie on the varying attitudes of many factory foremen towards "Safety First." It was afterwards republished by the company in its usual reprint form for wider circulation and accomplished much good. In the following article, Mr. Bowie views the same subject—but from a different angle. Though written primarily for the foremen of his company, it is worthy of wider circulation among the employes of other companies.*]

THE progress we are making in this plant in "Safety First" matters, generally speaking, is satisfactory. It is, however, rather sadly marred by many recurring cases of infections, especially among night men, all of which are absolutely unnecessary and avoidable. Let us try to make them so.

The infections alluded to are simply those arising directly from minor wounds, cuts, bruises and other trivial injuries, all of which would be practically harmless if they were sterilized and otherwise antiseptically treated at once.

It is not so generally known as it should be among skilled artisans that certain grades and brands of high speed steel have definite actinic qualities and when saturated or covered with oil or cutting compounds are potent factors in setting up infections of many kinds in human tissue, frequently producing most dangerous blood poisons. Even minute particles, whose impact is scarcely noticed, are as dangerous—sometimes more so, because unnoticed—as those which inflict positive blows. We must therefore guard vigilantly against these small wounds which may cause such deadly infections to arise.

Dr. Royer appeared before our board two months ago and gave us a comprehensive address on this matter, in which he specified four classes of infections occurring in this plant, and in most others as well. (I quote from my report of that meeting as follows:)

CAUSES OF INFECTIONS

1. Oil getting into the pores beside the hair follicle, causing boils and carbuncles.
2. Slivers of metal causing poisonous inflammation and eruptions.
3. Neglected cuts and bruises producing running sores; the immediate result of the injured not getting antiseptic treatment at once.
4. Eyes infected by using dirty machine cloths, thus setting up inflammation of several varieties.

These are the most imminent dangers which we have to induce our men to avoid, by going at once to the plant hospital, the very hour they first notice even the slightest scratch or abrasion of the skin.

This subject is so important in my own opinion, that I requested Dr. Neubauer, night doctor, to appear at one of our recent safety meetings. We had a full attendance. He addressed us on some other aspects of the question and states that if those who are injured in any degree, or have been, by an abrasion of the skin, exposed to infections of any kind—caused by steel, wood, iron, oil or what not—would present themselves for treatment at the hospital any time within three hours, all danger might be entirely obviated, and practically without the slightest pain.

That is medical science at its best—prevention rather than cure!

During the past three months 39 serious cases of infection have reported to the hospital, each of which came too late to prevent the infection doing

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its own "stunt" of work. Each one of these men had to suffer much needless pain, as well as a lay-off extending from three days to three weeks. In addition to the totally unnecessary expenses, which had to be defrayed by the company, we also had many hundreds of slight infections that might have been avoided had the men reported promptly.

Even as I write, Stanley Kneziech, Check No. 4421, reports for work after an absence of three weeks caused by his own negligence. His thumb was cut. He washed the wound himself, but he did not come to the hospital until five days later. It was then too late to counteract the infection. At the end of 10 days, blood poison developed and he had to be sent to Grace Hospital for heroic treatment, which just saved his life. His loss was three weeks of intense pain, and over $70 in money, all for the want of a timely visit to the doctor. He also cost the company twice as much as he himself lost.

It is very significant, in this connection, to reflect that while the "Wounds of War" are more numerous than the "Wounds of Industry" they are, strange to state, not so deadly. Why? Because within a comparatively few hours, men wounded by machine gun, rifle fire or bayonet thrust, are rushed to the field ambulance, to receive the aseptic treatment, as now practiced by Dr. Carrel and his corps of surgeons. Their new and improved methods (which insure perfectly clean wounds, so that nature herself can heal readily absolutely expel and destroy all infections, caused by germs of any kind.

The latest reports from the allied battle fronts, show that 97 per cent of all such war wounds are perfectly healed up by the new system on a fixed schedule of time, which can be calculated in each case to a nicety!

It is further interesting to know that the surgeons in our plant hospital, are pursuing practically the same improved methods, and can guarantee a like percentage of recoveries from wounds—always provided our men will consult them within three or four hours after injury.

It is not putting it too strongly to state the proposition in this form: That outside of those killed outright, or so mutilated as to require amputation, the percentage of those who recover quickly from their war wounds without infection setting in, is greater than the percentage which recover of our wounded without infection, because 22 per cent of our men delay in going to the plant hospital in good time to have their trivial or minor injuries disinfected or sterilized.

These are the special reasons why I write you this letter, that you may clearly see this matter in all its phases for the company, and so explain all its further bearings to your men for them *personally*, each and every man.

Inasmuch, therefore, as the company has provided the medical supplies and surgical skill, to guard the health and safety of its employes, at practically every point, it does seem to me that it is the duty of every man to take advantage of these precautionary measures for safety, which will be completely effective, all around, by ready compliance with the regulations laid down for the good of all.

Let your men, as soon as they are injured, go to the doctor who will in most cases, repair their injury and save them from having to repair to the hospital for further repairs!

May I again, therefore, ask your special consideration in this matter of infections, and your continued co-operation to make our plant a safe place in which to work?

I cannot conclude this letter in better words than those chosen by our vice-president, Mr. Buick, in the final paragraph of warning, in the book of rules:

"Acquire the habit of observing the rules at all times and under all circumstances, and thoroughly impress on yourself and on others the need of caution and watchfulness."

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00. The second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 264 ALL INDUSTRIES — SAFETY STIMULANTS.—Just as stimulants are required in our everyday life, so stimulants are required in safety work. True, many plans not considered in the light of stimulants are nevertheless so closely related as to be almost, if not altogether, stimulants.

Safety stimulants generally consist of remuneration and pride. Remuneration covers all the plans established to compensate in a material way, and pride covers all the plans established in a mental way.

A great many older "safety men" will say, "Do not stimulants beget habit?" and I answer No! providing the stimulant is administered properly.

When your business becomes stagnant do you sit back and allow it to become even more stagnant? Of course not, you look about for a stimulant and possibly apply it unconsciously, nevertheless you have used a stimulant.

Look up the word stimulant in the dictionary. It says, "Producing transient increase of vital energy." Just that one word *vital* justifies your actions—for is not your safety work vital? What if the immediate results are transient only? Isn't it a start?

Remuneration a stimulant? Yes, and many times it goes beyond this and becomes a builder.

Remunerative plans all have essentially the same idea, that of compensation for extra work in safety matters. Extra work in thought and judgment outside the regular duties. Remunerative plans should not consider the general humanitarian principle of safety work as the object to be attained but should be considered as a stimulant to this much desired goal.

To be effective, remunerative plans must not be so arranged that the accomplishment of the idea is secondary to the remuneration, because if such is the case safety work will be either forgotten or slighted.

Any remunerative plan to be successful must create a feeling of friendly rivalry amongst workmen both in reduction of accidents and prevention of accidents. Many remunerative plans have failed for the simple reason that they have not been considered in the light of stimulants, but have been designated and assumed to be cures for all manner of ills incident to safety work.

It is not the intention here to discuss any specified plan of reward for safety work except from the general way in which it should be considered.

Pride in safety work as a mental compensator for extra work has not been considered by the majority of safety men but nevertheless such compensation is surely felt by *real* safety men. Pride is also a stimulant, since its application is transient and also vital. Transient, because what we are proud of today becomes commonplace tomorrow, and vital, because it affects the whole structure of the safety organization.

Just as excessive remuneration tends to defeat the objects for which it is intended so does excessive pride defeat its object. Taken together remuneration and pride properly compounded as a stimulant are two of the greatest factors in safety work.

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No. 265 ALL INDUSTRIES—KEEPING UP INTEREST.—How can we keep up interest? That is the vital consideration in all our safety work; the one thing most difficult to do; the one thing, accomplished, that inevitably brings success.

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The formation of a safety organization in any company of men is a comparatively simple matter; a central committee and committees in all departments headed by foremen or others of some responsibility, with the men of the rank and file as members; periodical meetings of committees for discussion of safety matters and analysis of accidents, and, of very great importance, to have some one person whose particular job it is to see that interest is maintained. Upon that one thing, "keeping up interest," depends the success of any safety movement. With all the men alive to the good possible in such work, it moves on with marvelous results. Without their interest, the thing is dead.

In our own organization we have found it well to spend considerable time and effort upon our bulletin board service. Bulletins are changed frequently. They are livened up with attractive cartoons, well drawn. Different-colored papers are used to attract the attention of the fellow inclined to give the matter only an occasional reading. Happenings closely touching their work and their home life are used and so on indefinitely; anything to get the men in the habit of going to the bulletin board for the latest information on safety matters.

It is not difficult to make such literature attractive when safety work is first started, but the task becomes harder as times goes on, for the novelty begins to wear off and something else is needed to secure attention. That "something" is personal contact between the management and the men. We consider this the thing of most importance in our organization of 1,500 employes, operating a street railway and selling service for power and light purposes. We have six main departments, the work of each being radically different from the others. Our safety work, therefore, must be just as varied to get results. Since this is so, that much more effort must be expended to keep up interest.

We are continually encouraging our men to send in safety suggestions, giving them full privilege to make any suggestions for changes in equipment or methods of operating, which in their opinion will tend to eliminate hazards. We have found them responding eagerly. More than 800 suggestions have been received in the two years of our organized work. The fact that more than 60 per cent of these have been adopted proves that the men have given much thought to the subject. Then comes our chance to "get next" to them by full and detailed discussion of their suggestions. This is first done in department committee meetings, then in the central committee, and finally by the general superintendent. No suggestion is too insignificant to receive thorough consideration. Each approved suggestion is acknowledged by a personal letter to the author from the general superintendent, the operating head of our organization. We find this one of the best things we have done because the men treasure these letters as expressions of fellowship and understanding between them and the management—something entirely unheard of in the large percentage of corporations until within the last few years.

In case the suggestions are disapproved, the safety director sees the author in person and explains in detail the reasons for such disapproval. This gives opportunity to meet a large number of men, talk safety work over in various ways, get their opinions about safeguarding of machines and other changes already made, and about many different phases of operation. We consider this the best thing we are doing in our safety work, for meeting them as man to man shows that we are not merely doing a lot of talking about the question with the intention of dropping the matter altogether if it is not entirely satisfactory to us; but that we are really in earnest, have their general welfare at heart and will take any reasonable means to make the changes they suggest. We get their side of the story, discover many of the ups and downs they have which we never before thoroughly realized. They find they are co-workers with human beings like themselves, each having his problems to solve, and that all working together can produce better results for every one with a smaller sum total of effort.

Personal contact is the thing. Put on your shop meetings, if you will. Get good speakers to talk to the "fellows."

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Show the "bunch" some motion pictures and explain certain hazards to "them." Use the opportunity to ask for "their" help, and so on. Such methods are good, but we prefer, at slightly greater cost, to talk *direct to Bill;* to get acquainted with "his" peculiarities, come to an understanding of "his" difficulties, get "his" personal opinions, explain to "him" why we cannot make certain changes in operation, tell "him" why it has been a pleasure to install the safeguard "he" suggested and make it known to "him" that we are expecting "his" co-operation because it benefits "him." Let us talk to *Bill,* not to *them.*

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No. 266 FOR "THE MAN ON THE JOB" AT HOME—CAUSE AND PREVENTION OF HOUSEHOLD ACCIDENTS.—While great and much to be commended efforts are being made to safeguard the industrial worker, there has been and is still, one branch of safe practices that has failed to receive proper attention, and a field for action that is as worthy of argument and spread of printers' ink as the industrial movement, namely: The cause and prevention of household accidents.

Before passing into the prevention question, the time is ripe to make a searching inquiry into the causes of so many accidents in homes throughout the country. It is safe to state that a large majority of these accidents are due primarily to the same cause as the accidents in the steel-rolling mill, the woodworking shop or the knitting mill. This cause is that old familiar one, Carelessness or Thoughtlessness.

Undue haste in the many duties of the home has taken a great toll as regards serious burns, cuts, bruises and other classes of injuries. As a matter of illustration it requires but little thought to realize that when the kitchen fire is hastened in the morning with oils of any kind, mishap is close at hand. Wives all over the land are continually applying kerosene oil to the fuel, in order to speed up the breakfast for the husband who lies in bed until the last moment, and inducing his wife to do the same with, "Oh, we can spare another five minutes."

In the following paragraphs it is the intention of the writer to show in just what manner a number of accidents occur. They will be classified in order that we may better appreciate the full value of the several items.

ELECTRIC APPLIANCES

The electric fan should be placed well out of reach, not only of children but also of adults.

Failure of parents to properly instruct children as to the danger of a rapidly revolving fan.

The bad practice of handling electric fixtures of any description while in connection with any earth-connected agent, such as water pipes, gas pipes, etc.

The telephone should never be used during an electrical storm, as static discharges of great violence are ever present during such storms, and many serious shocks and burns have been experienced by persons using the instrument at these periods.

Loose-hanging chandeliers, wall brackets hanging by one screw, socket keys broken partly, or with the hard rubber covering missing entirely, are all matters that should receive immediate attention as regards repairs.

GASOLINE, ITS PROPER USE AND STORAGE

It is well to remember that the fluid of gasoline in itself is quite harmless. The vapor arising from gasoline is the dangerous element. The vapor from one pint of gasoline causes 200 cubic feet of air to become highly explosive, therefore, when cleaning gloves with gasoline, do so in the open air. During the hot months of the year select a shady place for the operation, as cases are on record of gasoline fires due in the main to reflected light, or where window glass induced ignition.

In the use of gasoline stoves, the reservoir should never be filled after dark, nor while fire or flame of any kind is present.

Great care should be exercised in lighting a gasoline stove so that after the heating cup has been filled the supply valve is closed properly, and not opened again until the needle is sufficiently hot to generate gas.

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Gasoline should at all times be stored in a cool place, in a safety can painted red, and plainly marked GASOLINE.

THE HOME IN GENERAL

Close inspection should be made of all canned foods, prior to opening, in order to discover breaks in the can which might have admitted air to the contents and spoiled them. The following canned food products are particularly liable to taint: Salmon, oysters, corn, tomatoes, and condensed milk.

Water should never be poured from one vessel to another while on a hot stove. Many steam burns result from this practice.

The sadiron has caused many injuries to housewives, on account of the frequency with which the portable handle suddenly releases from the iron proper. To overcome this possible happening, care should always be exercised in the carrying of sadirons, and this care should amount to making sure that the handle is securely fastened, and, even when assured that this is a fact, the iron should be held at a distance from the body, so that if it should give way, the feet will be out of range.

Every stairway in every home should be provided with handrails extending from the top to the bottom of the flight. Where small children have access to stairs a suitable gate or guardrail should be installed at the top. The construction of this safeguard should be so arranged that small fingers cannot unlatch the fastening.

Cutting and carving all meats or other materials should always be done with the edge of the knife leading away from the operator.

One could continue almost indefinitely along the lines as set forth, but the same general thought should obtain at all times; to avoid undue haste, to be thoughtful, and never fail to caution others as to the unsafe manner in which they are performing this or that task. To be safe at all times, one must not only pay special heed to his or her own particular movements but the actions of others. It is a well known fact that many accidents have been caused by the "other fellow." Were the other fellow educated along safety lines, he in turn might lend his effort and the ultimate result would be a great universal education. As a consequence, a most wonderful advance would be made in the greatest of all modern movements, that of conservation of life and limb.

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No. 267 EDUCATE THE GENERAL PUBLIC IN ACCIDENT PREVENTION THROUGH REGULAR INSTRUCTION IN EVERY SCHOOL ROOM.—In spite of the vast amount of effort which has been put forth in the past few years for the prevention of accident, by industrial and public service institutions, and the wonderful results already obtained in the reduction of accidents and the curtailing of both human suffering and property losses, those who have been the leaders in the movement feel that they are only pioneers who are blazing the way for greater work in the conservation of life, limb and property.

Safety workers everywhere feel the need of the extension of safety work beyond the limits of the particular business with which they are individually connected, so that the general public will be aroused to the necessity for care and caution on the streets, in all public places and in the homes.

Without burdening the reader with statistics, it is well known to everybody that more accidents occur in the homes and upon the streets than upon steam and electric railroads and in industrial institutions.

STOP AND THINK!

The average mechanic or laborer works 8 or 10 hours daily under conditions which tend to his safety (in most cases) and receives, while so employed, various suggestions from his employer and his fellow workmen as to the safest way to do his work. During the remaining 14 or 16 hours per day he is away from safety influences and receives very little encouragement to prevent accident to himself or others.

Think of the mother and children and what their dangers are. You will certainly agree that it is "somebody's" business to assist them by suggestion and

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education, so that home accidents and street accidents may not occur to their injury.

All animals have the inherent desire for self preservation, and mankind is more reckless or thoughtless of safety than any of the so-called lower animals. This is because man has for ages been trying to show his superiority by endeavoring to accomplish great things which may give him more power or greater enjoyment.

In this universal struggle for supremacy, man has lost sight of the simple rules of safety. He has become so wrapped up in his own selfish ambitions as to grow thoughtless of his own personal liability to accident and to forget that he has any obligation to care for his fellow men.

How best to reach the masses as individuals and arouse everyone to the necessity of individual study and effort to foresee and prevent possible accidents is a deep problem, one to which educational leaders ought to give their attention. Of what value is the professional, technical or business education without the fullest understanding of safety rules and the responsibility which rests upon the educated man, not only for his own safety but for the protection of less fortunate people?

America is justly proud of her educational advantages, and leads the world in her public recognition of the necessity of education, as is indicated by her vast system of public schools and her truly wonderful colleges, technical and scientific institutions. The prime object of all these schools is to make the student more capable of obtaining a living for himself and those directly dependent upon him, and to fit the mind for bettering the conditions of the entire populace.

These are the things worth striving for. But would it not be wise for all teachers in all schools, from the primary department to the highest course in the highest schools, to impress upon students the importance of safety habits in every walk of life, inculcating the idea that everyone has a duty to perform in preventing accident to others?

If this is done, methods of accomplishing the desired end will readily appear, and before long a vast army will be doing safety work both by example and by suggestion.

SUDDEN STARTING OF MOTORS

REPLIES to the question below are requested for publication in SAFETY ENGINEERING:

> We wish to ask SAFETY ENGINEERING to give us what information it has that will help us to protect men who are called to work on line shafts, belting, and about machinery who are apt to be injured by the sudden starting of motors. We presume that the only absolutely safe method of guarding against this hazard is the locking of the handles on the starter boxes, but as this presents some problems, we are asking if you will give us what information you have so that we may be able to adopt the best method to protect our men. We have tried placing signs on the starter boxes to warn men not to start the motors, as men were working on the line, but we find that those who place the signs on the starter boxes sometimes go away and leave them and consequently there is a delay in starting the machinery in that department. We have also had "near" accidents where men have ignored these signs and started the motors, thereby endangering those who were working on machinery.
>
> W. O. C.

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Prizes for January Articles

First Prize. No. 263. E. M. Peake, Chief, Safety Department, Carnegie Steel Company, Pittsburgh, Pa.

Second Prize. No. 262. E. H. Hart, Safety Engineer, Ocean Accident & Guarantee Corporation, Ltd., Dallas, Texas.

Honorable Mention. No. 259. G. S. Brown, President, Alpha Portland Cement Company, Easton, Pa.

Other meritorious articles were contributed by A. L. Davis, Crucible Steel Company, Pittsburgh, Pa., and E. E. Bach, Sociological Director, Ellsworth Collieries Company, Ellsworth, Pa.

Comments by Members of the Committee

My vote is for No. 263. The keynote of the accident prevention situation lies in the statement, "Educating the workman to do that which he knows he should do."

I agree with 262 to such an extent that I cast my vote for him. He shows that he has a clean grasp of "Safety First" conditions. His description of the wood jointer incident reminds me of a similar incident, where an inspector, in the course of his duties, recommended a guard for a jointer. The old gentleman who owned the factory received the recommendation with much disfavor and replied, "I don't want a guard; my son, George, runs the jointer." The inspector was insistent, however, and a few days later called to hurry up compliance. A much greater opposition was encountered than before, and couched in the following sentence: "I don't want a guard. George had a hand cut off on the —— jointer and I don't give a —— what happens to the other fellow."

It would pay all of us to look at "Safety First" and think of all the good that is derived from it, not to take it as a joke; but try to do better each time as the writer of 262 suggests.

I vote for 259 because a man should think first and try to prevent accidents. One little thought goes a long way in "Safety First."

No. 263 confirms all the essentials of a safety campaign. We must have the cooperation of the head, and of all of the departments, and that not in a perfunctory, but in a whole-hearted spirit.

I think 263 is a very good article, for the man doing the work knows that all the heads are in the safety movement heart and soul. He is not going to take a chance.

I vote for No. 262 as it goes back to the foundation of the safety movement, and its improvements, for the welfare of employe and employer.

I cannot help expressing myself as to the article "The Evidence as to Alcohol," by N. C. Harte. His theory may be all right in connection with breweries, but not for the industries in general. For instance, my work, pertaining to machinery, takes a man of steady nerve. When a man has two glasses of beer he has not his natural senses. My work is on nail machinery and I have been employed at this work for 17 years and have had a wide experience in the work. In these years I recall two accidents—one proved fatal and the other led to the amputation of a finger. The man who had his finger taken off was reaching in the machine while the machine was in operation, because he was under the influence of liquor. I could not state whether it was mild liquor or not. If we abolish whiskey, we must also abolish beer. The other man had his thumb

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crushed and, while under the doctor's care, blood poisoning set in and he died, leaving a widow and six small children. The doctor told me that if he had not exposed himself he would have recovered. These were two results of liquor.

In the shop, I had the experience of one man who drank considerably. In his "sobering up" he would get so nervous that a nail would fall out of his hand. During the absence of the foreman he secured some beer and became intoxicated. He came to me and said, "Look in the machine, there are two nails coming out at once." In our style of machine it is possible for only one nail to come out at a revolution. If I had left that man at his work there might have been a serious accident.

I hold a position on a committee, called the Workmen's Committee, and help to make a monthly inspection. I am always on the lookout for danger as I think it is my God-given duty to look after my fellow men, not the careful man but the chance-taker. The careful man is the best "safety man."

I wish to state that SAFETY ENGINEERING has given me a great amount of information regarding safety.

Coal-Mine Fatalities Decrease

Compiled by Albert H. Fay

THE returns received by the Bureau of Mines, Department of the Interior, from the State mine inspectors show that 1916 was a banner year in the low record of coal-mine fatalities in the United States. The decrease was about 3 per cent as compared with 1915, while the production of coal increased about 12 per cent. The number of fatalities reported during the year was 2,225, as compared with 2,269 for 1915. Figures are not yet available showing the actual number of men employed during the year, but on the basis of the number of men employed in 1915 the fatality rate was 3.03 in 1916 as compared with 3.09 per 1,000 men employed in 1915. This is the lowest rate since 1898, when about one-half the number of men were employed.

According to the Geological Survey the estimated production of coal for 1916 was 597,000,000 tons as compared with 531,619,487 tons in 1915, so that the number of tons of coal mined per fatality in 1916 was 269,000 as compared with 234,297 in 1915 and 209,261 in 1914. The production per fatality in 1916 is therefore the greatest in the history of coal mining in the United States.

During 1916 there were 11 mine disasters, in each of which 5 or more men were killed, being the same number as in each 1915 and 1914. The number of men killed by these disasters in 1916 was 154, the lowest since 1901, as compared with 262 in 1915, 316 in 1914, and 464 in 1913. The principal net decreases in fatalities for the year were as follows: Falls of roof and coal, 14; gas and dust explosions, 78; explosives, 9; surface accidents of all kinds, 12. While in the above causes there was a gratifying decrease shown by reason of the educational work conducted with reference to the study of gas and dust explosions and the introduction of permissible explosives, there was a net increase of 43 fatalities due to mine cars and locomotives underground and an increase of 8 in various shaft accidents. As haulage systems necessarily increase in scope as the mines become larger, there should be a concentrated effort on the part of all to reduce the hazards connected with this feature of the mining industry.

Although the net decrease is not large, yet it shows that the efforts exerted by the various agencies whose object is to reduce mine accidents are meeting with success. Among the means employed to reduce accidents may be mentioned the general use of safety lamps in doubtful mines, the introduction of permissible explosives, humidifying dusty mines, first-aid and rescue training which save lives that might otherwise be lost by reason of injuries received; the enactment of industrial accident compensation laws, and the spirit of co-operation.

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EDITORIAL

Maximum Safety

THE eyes of the nation are centered upon industrial America. We are taking stock of the condition of our industries and organizing them for a possible demand that may tax their efficiency to the utmost. The great conflict in Europe has demonstrated that industrial efficiency is a vital factor in modern warfare. The consumption of material in the warfare of today is stupendous. Success depends largely upon production meeting demand—no matter how great the demand may be. There must not be any interruption in the steady flow of needed material.

While the efficiency of industrial America has been well demonstrated during the past year or two, by the ability to produce an enormous increase of material, the toll of human life and limb has been great. At least 30,000 industrial workers have been killed in our industries during the past year, and at least 1,000,000 injured. This is deplorable, for in both peace and war the industrial worker is the sinew of our strength. Thousands of the dead and injured would be alive and well today if carefulness and caution were insisted upon, by both employer and employe, as a primary duty.

In considering maximum output we must consider maximum safety. It should be the resolution of every industrial employer that no preventable accident shall occur in his plant. Furnishing all necessary safeguards for men, acquainting the men with the elements of safety, creating a spirit of co-operation in preventing accidents are the means by which success can be achieved. Hitherto the measurement of a plant has been expressed in terms of production. Today the requirements are for safe production.

Sobriety and Safety

ACKNOWLEDGMENT is here made of the receipt of a number of letters from readers of SAFETY ENGINEERING who have been disturbed because an article appeared in the January number, "The Evidence as to Alcohol," by Nathaniel C. Harte, which gave, among other statements, interesting facts regarding a low rate for compensation insurance on certain brewing establishments, where the men are permitted to drink beer freely. Having published numerous articles on the use of alcohol by employes, from the point of view of safety, notably Dr. Hourigan's article in the December number, we felt it to be merely ordinary courtesy and fairness to give space to an article dissenting from some of Dr. Hourigan's conclusions, the argument, of course, being Mr. Harte's, not ours. No cause, not even prohibition, is injured by permitting an opponent, who talks courteously and to the point, to have a respectful hearing. As firmly as anybody else, SAFETY ENGINEERING believes that a sober workman is the only safe workman. But the editorial principle of this magazine is to allow the pros and cons of any important proposition to be debated in its pages. "The truth is mighty and will prevail."

Employers' Duty to the Public

AN epigram by President Edson S. Lott of the United States Casualty Company, taken from a letter to the editor of SAFETY ENGINEERING, should be read and pondered by every employer of labor: "The payment of compensation for the result of an accident is the discharge of a private obligation. The prevention of an accident is the bestowal of a public benefaction." We give space, modestly, to a further remark by President Lott, complimentary to this magazine: "SAFETY ENGINEERING is preventing accidents. Long may it live, and always may it prosper."

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Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all lines of industry to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

Specifications for Safety Devices

THE Illinois Steel Company has published "Specifications and Devices for Safety of Workmen on and about Machinery to Be Constructed and Installed, and Operating Conditions to Be Maintained at Its Plants." The information presented in the book was prepared under the supervision of the company's Central Committee of Safety, and is the result of the experience of that committee and of the various plant safety organizations, in preventing injuries to employes. It is to be used as a guide in standardizing the safety appliances and precautions necessary to protect employes from the dangers incident to machinery and working conditions, and to insure the provision of efficient safeguards and proper working conditions at the time construction work is planned and machinery is installed.

Lackawanna Safety Rally

THE annual Safety Rally of the D. L. & W., Morris and Essex division employes and their families, was held Sunday, January 28, 1917, at the Palace, Newark. The meeting was opened by a remark by W. C. Wilson, secretary of the Central Safety Committee. Safety talks were made by M. A. Breitsprecher, conductor; Richard Trezise, engineman, and Thomas E. Sherman, ferry engineer. "Safety and the Human Element" was the subject of an address by Marcus A. Dow, general safety agent of the New York Central Lines. A safety photo-play was a feature of the program. W. H. Truesdale, president of the Lackawanna, assured the employes of the company's desire to co-operate with them in every possible way. These safety rallies are an important feature in the Lackawanna safety campaign and are held by each division at least once a year. The division that has the best safety record for the year receives a flag and the men in each division who have done the most work for safety receive "Award of Merit" charms. The competition among the divisions, and among the men in each division, for these prizes, insures the success of the campaign for safety.

Safety Council in Rochester

THE Foreman's Group of the Rochester Local Safety Council has an interesting program for the winter. The local includes in its membership foremen of 40,000 workers, or two-thirds of the industrial population of the city. Subjects for discussion include: "Fire Protection in Factories," "Shop Lighting," "Methods of Inspection and How to Increase Interest in Safety," "Dangerous Practices and Their Elimination," "Shop Sanitation," "Pure Drinking Water," "Instruction of Employes on Health," and "Safety in Electricity." Meetings are held about once a month, and an energetic campaign is being pushed to enroll all the foremen who have not previously shown interest.

Making a State Fireproof

"MAKE Minnesota Fireproof" is the slogan on the first page of the bulletin from the office of the State fire marshal, R. W. Hargadine. The office also sends news matter to the newspapers pointing out dangers which should be avoided as shown by fires in the State. One news story tells of three cases where children

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were burned by leaving them in the house where they could play with fire while the parents were absent. Another is devoted to the danger of fires in garages, and tells the proper manner of storing gasoline.

Perils of Waste Paper Piles

A NEW fire hazard has been developed from the movement started by the federal government for the collecting of waste paper in order to relieve the paper shortage. In a number of communities the school children have taken the matter up and have been collecting waste paper, which is brought to the school house and kept until a sufficient quantity has been accumulated to be disposed of. A number of fires have been started in these collections of waste paper and the fire losses have been much larger than the paper salvage would amount to in many years. Fire prevention authorities insist that if waste paper is to be collected in school buildings it should be baled and shipped the same day and carefully safeguarded in the meantime.

National Association of Manufacturers

AMERICAN INDUSTRIES announces the appointment of Carl M. Hansen as chairman of the Committee for Accident Prevention and Workmen's Compensation of the National Association of Manufacturers. Mr. Hansen succeeds R. G. Williams of the Norton Company, Worcester, who while withdrawing from the chairmanship which he has occupied for the past two years will remain a member of the committee. While secretary and chief engineer of the Workmen's Compensation Service Bureau, Mr. Hansen evolved and put into practical application the Universal Analytic Schedule, now called the Industrial Compensation Schedule, used in nearly every State where compensation laws are in effect. This schedule is the instrument demanded for years by the National Association of Manufacturers on the ground that safety work in the plant should be reflected in the insurance premium. Mr. Hansen is the author of "Universal Safety Standards," a work of 13 volumes. He has been a frequent contributor to technical journals on such subjects as accident prevention, occupational diseases, workmen's compensation, etc. He has been closely associated with SAFETY ENGINEERING for the past two years, having served as associate editor. The news of his appointment to the chairmanship mentioned is an important announcement in the accident prevention movement in the United States.

Carl M. Hansen

Silence Second Is a New Slogan

"SILENCE SECOND" is a new slogan to go with "Safety First" on one Western road. In an order issued by the company, trainmen in the cars are forbidden to talk while passengers are sleeping.

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They must either whisper or use signs. Passengers are requested to do likewise. Noises of the train and yard noises are to be kept down to a minimum. Switching is to be done carefully so as to shock neither the passengers nor the equipment. Another Western road has strengthened its safety movement and its service to the public by ordering employes to think first of safety, second of the comfort of passengers and places punctuality of trains as third in importance.

Pulmotors Save Six Lives

ONE person was killed and six persons, including a family of 5, were overcome and saved only by the quick use of pulmotors when coal gas escaped and filtered through the various rooms of a Russian and Turkish bath in New York City on January 30. It was found that the gas had escaped from a number of small coal stoves used in connection with the bath, which had been banked for the night.

Mr. Bradshaw's New Connection

MR. THOMAS P. BRADSHAW, M. E., for the past two years technical assistant at the American Museum of Safety, has resigned from the museum's staff to become mechanical safety engineer with the American Smelting & Refining Company, 120 Broadway, New York City. Mr. Bradshaw is a graduate of Stevens Institute of Technology. Last fall Mr. Bradshaw was commissioned by the National Committee for the Prevention of Blindness to investigate eye hazards and measures for control to be found in the representative industries of Buffalo. Approximately 100 factories and workshops, large and small, were inspected. A detailed report on each has been made. Conferences held with the safety directors and officers of the various concerns helped to solve special problems relating to the larger development of safety methods, and likewise to inspire others who have not heretofore recognized the humanitarian and economic advantages in the protection of the vision of their employes. The final report will provide a handbook of useful information for the conservation of vision in industrial operations.

"The Story of Steel"

THIS is an interesting pamphlet published by the Bureau of Safety, Sanitation and Welfare of the United States Steel Corporation. Donald Wilhelm is the author. Each of the pages carries 16 half tone cuts around the margins showing the sequence of the different processes. The United States Steel Corporation is spending more than $6,300,000 a year for the welfare of its employes. The successful work of the Bureau of Safety, Sanitation and Welfare is indicated by the figures showing the decrease in the rate of accidents per 1,000 employes.

Year.	Decrease. Per Cent.	Saved from Serious Injury.
1907	10.40	532
1908	18.21	783
1909	25.28	1,236
1910	43.49	2,215
1911	41.26	2,012
1912	36.06	2,023
1913	38.29	2,273
1914	40.52	1,748
1915	43.54	2,145

A change in the system of reporting accidents made January 1, 1911, resulted in more accidents being reported and classed as serious than formerly was the case.

Industrial Disease Prevention

"TO establish adequate health prevention in industry," says Colonel George Pope, in *American Industries* for January, "involves two distinct duties on the employer. First, his individual responsibility in his particular plant, factory or industry; secondly, his co-operation with local, State and national organizations whose activities are directed towards this beneficent result. Each of these obligations is inter-related, and each absolutely necessary."

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Metal Working in Ford Plant

AN automatic electro-magnetic device for prevention of accidents to workers handling large punch presses where workmen are separated by the machine, has been installed in the Ford plant at Detroit. In operating the press it is necessary that four buttons be pressed simultaneously before the press can work. As these require the two hands of each of the men to operate, there is no chance for one man to nip his fellow's fingers. On smaller machines operated by a single man, two levers are provided which must be used simultaneously to cause the machine to work.

Safety Lectures in Philadelphia

A COURSE of 10 lessons in accident prevention, conducted by the instruction department of the Central Branch Y. M. C. A., Philadelphia, began February 13. H. B. Harmer, safety engineer of the Philadelphia Electric Light Company, has been secured as instructor and discussion leader during the series. The opening lecture on "The Purpose of Accident Prevention" was given by Lew R. Palmer, president of the National Safety Council. The studies will cover: The Purpose of Accident Prevention, the Organization of Plants, Accident Statistics (Compilation and Use), Education of Employes Regarding Guards, the Shop Environment—Welfare Work, Street Hazards, Home Hazards, Fire Hazards, Physical and Mental Examination of Employes, and How to Organize for Emergencies. The lecturers: James B. Douglas, manager claims department, United Gas Improvement Company; Dr. F. D. Patterson, chief division of hygiene and engineering, Pennsylvania Department of Labor and Industry; H. W. Forster, manager Independence Inspection Bureau; M. M. Sheedy, manager Pennsylvania Manufacturers' Association Casualty Insurance Company; B. Frank Day, statistician, Philadelphia Electric Company; Robert H. Moore, manager Manufacturer's Casualty Insurance Company; Dr. Eldridge Eliason, first aid surgeon, University of Pennsylvania; Dr. Seneca Egbert, dean, Medico Chirurgical College; Dr. W. Franklin Baker, department vocational therapeutics Hahnemann Medical College; George W. Braden, health department, Central Y. M. C. A.

General Chemical's Competition

EIGHTEEN branches in different parts of the country conducted an accident competition for a year. Deaths were penalized as loss of 240 hours. Percentages were computed on the basis of the hours worked in relation to the full time of the workers. The winning plant lost only one-twentieth of one per cent of the total time. The lowest plant lost three-quarters of one per cent. The largest plant on the list finished fifth, with a score of .9987. No plant had more than one fatal accident. In addition to the plant contests the departments of each plant competed for flags. The contest will be repeated this year, as it has proved a strong safety incentive.

Safety Exposition of Ohio

THE Third Annual Industrial Safety Exposition of Ohio will be held March 6 to 10 in Memorial Hall, Columbus. Victor T. Noonan, director of safety of the Industrial Commission of Ohio, is in charge of the exposition and undoubtedly will make as great a success of this year's exposition as in former years.

California Accident Commission

THE Industrial Accident Commission of the State of California has commenced to issue a pamphlet termed "Safety News." No. 1 is just out. John R. Brownell, superintendent of the Department of Safety, announces that his office is inaugurating an educational movement with the earnest hope that it will produce direct results in saving workmen from industrial accidents.

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Safety Inducements to Foremen

AS a safety inducement to foremen one large industrial concern (Raritan Copper Works, Perth Amboy, N. J.) says in its safety bulletin: "All heads of departments believe in promoting efficiency through the enforcement of safe practices, and for that reason consider a foreman's accident record whenever there is a question of increased pay or promotion. Is he a safe man to entrust with a large force of men? Is he enthusiastic enough about safety to inject the same spirit into the sub-foremen who would be in closer contact with the men? These are the questions which have to be answered." That is an argument where money talks.

Safety First on Railroads

THE Safety First section of the *Employes' Magazine* of the Chesapeake & Ohio Railway has 30 pages filled with timely matter. Black type is to present warning slogans, such as: "If you are afraid of any particular thing, that fear begins to minimize the effect of your efforts the moment it takes possession of your mind. To begin an undertaking with fear of failure, is reasonable assurance that failure will follow." "Co-operate with your fellow employe to avoid injury. Look out for the other man, you may injure him. The best safety device known is a careful man. Carelessness never won promotion."

Fire Prevention on Railroads

THE next annual convention of the Railway Fire Protection Association will be held in St. Louis on October 2, 3 and 4. G. L. Ball, of the 'Frisco railroad, is chairman of the committee on arrangements.

Safety Picture Booklet

THE executive secretary of the Conference Board on Safety and Sanitation of the National Founders' Association, the National Association of Manufacturers and the National Metal Trades Association has issued a 32-page booklet, 3¾ inches by 2¾ inches, showing illustrations of how industrial accidents happen. The booklet is intended for general distribution, a copy of which can be secured by addressing the secretary at West Lynn, Mass.

Rubber Gloves in Electrical Industries

C. W. WARD, of the Duquesne Light Company, Pittsburgh, replying to a question on rubber gloves in the National Electric Light Association *Bulletin,* says that the most satisfactory combination his company has been able to find is a triple glove. Next to the hand is a canvas glove for warmth in winter and to protect the rubber from grease and dirt from the hands. Outside of this is a thin glove of almost pure rubber for insulation. A soft leather glove on the outside protects the rubber from wear. These gloves are interchangeable and each may be renewed when worn out.

Safety in Paper Mills

A WISCONSIN paper mill which has been increasing its plant and installing new machinery asks its force to exercise the same care in individual small jobs that the officers and foremen exercised in this big job in which no man was injured. Suggestions for places where guards and railings may be placed are asked for from the men. This same mill observes that its accidents increased when it employed a lot of new men, and asks co-operation of foremen and older employes in teaching them the "Safety Habit."

Canadian Statistics

THE industrial accident record for November, 1916, published in the Dominion of Canada *Labour Gazette,* records that 74 workers were killed or fatally injured, and 388 injured. The record for October was 58 killed and 356 injured, while that for November, 1915, was 57 killed and 546 injured.

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Rochester Jolts a Maxim

THE maxim that you can't force "Safety First," that it requires co-operation, got a jolt in Rochester not long ago. The Rochester Local Safety Council organized a boys' safety committee under the guidance of the Grammar School Safety Council, composed of members of the different groups in the local. Two boys in one of the schools refused to sign an agreement not to snowball within a certain distance of the school. Finally the boys' committee caught them in the act, and, taking them behind the school, administered black eyes. That proved a decisive argument.

Goggles for Horses

IN order to secure greater efficiency and prevent unnecessary suffering to the eyes of the horses, a briquette plant, situated in California, furnished goggles for its horses. The sulphurous fumes and smoke peculiar to this industry caused injury to the eyes of both men and horses, and when ordering goggles for the men, instructions were also given for leather masks fitted with mica lenses for the horses.

Gas and Electric Safety Bulletin

A WESTERN gas and electric company has adopted a very effective form of safety bulletin. When an accident occurs it prints a line drawing of the circumstances, gives the names of the men involved, and explains where the blame is to be placed. The picture will draw attention where a mere printed bulletin might be passed by. Giving names, whether for censure or praise, is sure to arouse interest.

Fire Prevention in Westerly

IRVINE O. CHESTER, of Westerly, R. I., recently offered, through the educational committee of the Westerly Board of Trade, gold, silver and bronze medals for the three best essays on "The Prevention of Fires in Westerly," written by public school pupils of the seventh and eighth grades. Two hundred and twenty essays were submitted, an effective method for teaching fire prevention in the schools.

Safety in Total Abstinence

THE Youngstown Local Safety Council has endorsed the total abstinence movement as a "Safety First" measure and has prepared and printed cards to further the movement. These read:

MAHONING AND SHENANGO COUNTY SAFETY COUNCIL WATER WAGON PLEDGE

As the use of alcoholic liquor is one factor in causing accidents, impairing health, and blighting child life, I promise to use my influence, jointly and severally to promote abstinence among my associates and all other employed men and women.

Name..... Date.....

Electric Pressing Irons

THE N. F. P. A. has been making a study of the fire hazard due to the electric pressing iron. The only difficulty has been that safety has been sacrificed for cheapness in the construction of the articles. Electrical heat can be safeguarded automatically if the user is willing to pay for safety. It is thought that co-operation between manufacturers, central station companies, inspection departments and the public will lead to the use of the safer though more expensive article.

"Safety First" in General

"THE remedy of tomorrow is too late for the mistakes of today," is the moral Oscar Mowrey appends to an article, "Making Mistakes," in a recent issue of the *Valve World*, published by the Crane Company, Chicago. "A wise employer will treat with due consideration an occasional error, even though it may involve an infraction of some rule. However, don't let it occur often. ***Don't let it become a habit.***"

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection amounts to little in numerous cases.

CHURCHES

December 31, 1916. Wellesley, Mass. Congregational Church. Washington and Central streets. One building, 40 feet high with 80-foot steeple, destroyed. Walls, wood. Floors, wood. Cause, overheated furnace. Fire started in basement. Discovered by janitor about 5:45 p. m. Alarm, regular fire alarm system. Duration, 3 hours. Stopped when building was practically destroyed. Fire was favored by all wood construction. Firemen handicapped by lack of sufficient water pressure. Persons in building, 2. Means of escape, usual exits. Value of building and contents, $35,000. Property loss, total. Special aid was asked from Newton and Waltham. Roofs of several neighboring buildings caught from this fire, but were quickly extinguished with no loss.

January 1, 1917. Rockport, Ind. St. Bernard Catholic Church. Elm street. One 1-story building destroyed. Walls, brick. Floors, wood. Roofs, shingle. Cause, unknown. Fire started near Christmas tree about 7 a. m. Alarm, regular system. Duration, 5 hours. Stopped when woodwork was consumed. Firemen handicapped by difficulty in reaching flames. Persons in building, none. Means of escape, 3 doorways. Value of building and contents, $5,000. Property loss not reported to SAFETY ENGINEERING.

COLD STORAGE AND ICE PLANTS

December 6, 1916. Weston, W. Va. Malloy Bros. W. Fourth street. Ice plant and bottling soft drinks. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, felt on rubberoid. Cause, sparks, either from railroad locomotive or nearby planing mill. Fire started on roof. Discovered by passerby about 3 p. m. Alarm, telephone. Duration, 3 to 4 hours. Stopped when building was consumed. Fire was favored by all-wood construction. Firemen handicapped by long distance to hydrant and insufficient water pressure. Private fire apparatus, a few buckets, use of which saved houses across the street. Persons in building, 2. Means of escape, ground floor. Value of building and contents, $35,000 to $40,000. Property loss, total.

DEPARTMENT STORES

December 6, 1916. Murfreesboro, Tenn. Fry & Co. East side of public square. Dry goods. One 2-story building destroyed, 4 others damaged. Walls, brick. Floors, wood. Cause, unknown. Fire started supposedly in rear of building. Discovered by a passerby about 4 a. m. Alarm, private. Duration, 4 hours. Stopped at a cafe. Fire was favored by proximity of buildings. Firemen handicapped by partitions. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $73,000. Property loss, $73,000.

December 20, 1916. Birmingham, Ala. The Parisian Co. 1913 Third avenue. Dry goods. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started supposedly in second story. Discovered by policeman about 5:55 a. m. Alarm, street box. Duration, 4 hours. Confined to building. Fire was retarded by good walls. Persons in building, none at time of fire. One fireman slightly injured. Means of escape, front and rear fire escapes. Value of building and contents, $150,000. Property loss, $100,000.

December 21, 1916. Newcastle, Pa. J. N. Ewers and Brown & Hamilton. Department store. One 4-story building destroyed. Walls, brick, 13 inches thick. Floors, wood, 16-inch joists. Roofs, wood covered with tin. Cause, unknown. Fire started in 3rd story. Discovered by policeman about 1:05 a. m. Alarm, Gamewell system. Duration, 6 hours. Stopped in same building. Fire was favored by adjoining buildings having floor joists running through wall into burning building. Private fire apparatus, small hand extinguishers. Persons in building, none. Injured, 2 firemen hurt by falling wall. Means of escape, short fire escape in rear. Value of building and contents, $270,000. Property loss, $52,000.

January 7, 1917. Brockport, N. Y. The Levan Company and others. Main street. Department store and jewelry store. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started at foot of elevator shaft in basement. Discovered by policeman about 3:45 a. m. Alarm, general. Duration, about 1 hour. Fire was confined to rear of building. Fire was favored by open elevator shaft, no fire doors. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING.

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Office of the Oakes Manufacturing Company, Long Island City, N. Y., where 9 persons burned to death on October 17, 1916. The company manufactures dye-stuffs. The fire is supposed to have started from the overturning of a bottle containing chemicals in the storeroom on the first floor. The building was a frame structure with wood floors and tar roof. Those killed were all office employes. The loss of life was due to their delay, trying to save the records of the company, until all means of escape were cut off. There was an outside iron stairway from second floor to the ground, two iron ladders from ground to roof and an inside enclosed stairway from the second floor to the first floor. The alarm was received from the Astoria Veneer Works, a nearby plant, no direct alarm being sent from the Oakes plant. The fire burned for 24 hours, stopping at piles on pier. There were 180 employes of the plant.

Value of building and contents, $14,000. Property loss, $6,500.

DWELLINGS, ORDINARY, CITY

December 25, 1916. Brooklyn, N. Y. O. K. Buckley. 28 Lenox road. Dwelling. One 2½-story dwelling partially destroyed; two others slightly damaged. Walls, wood. Floors, wood. Roofs, wood. Cause, lighted gas jet ignited Christmas decorations. Fire started in dining room, ground floor. Discovered by occupant about 7:52 p. m. Alarm, street box. Duration, 10 minutes. Stopped at roof. Persons in building, not reported to SAFETY ENGINEERING. Killed, 2. Means of escape, doors and windows. Value of building and contents, $15,000. Property loss, not reported.

ELECTRIC LIGHT AND POWER STATIONS

January 6, 1917. Palo Alto, Pa. Eastern Pennsylvania Railways Co. Bacon street. Light, heat and power plant. One 2-story building destroyed. Walls, brick and steel. Floors, yellow pine. Roofs, wood and tin. Cause, unknown. Fire started in storehouse. Discovered by employe about 6:10 p. m. Alarm by whistle on powerhouse. Duration, 6 hours. Stopped at east end of building. Fire was favored by construction of building and inflammable contents. Firemen handicapped by poor water supply. Private fire apparatus, hose and fire extinguishers. Persons in building, about 50 employes. Means of escape, doors opening on main street. Value of building and contents, $250,000. Property loss, total.

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Rear of the building of the Oakes Manufacturing Company, Long Island City, destroyed by fire October 17, 1916. Nine employes were burned to death in the office in second story. A quantity of dye-wood, partially burned, is shown in the photograph.

ELECTRIC TRACTION PROPERTIES

December 29, 1916. Toronto, Ont. Toronto Street Railway Co. 601 King street, east. Street car barns. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, wood, tar and gravel. Cause, unknown. Fire started on west side, in center. Discovered by workmen about 8:38 p. m. Alarm, telephone and fire-alarm telegraph. Duration, seven hours. Stopped at southeast corner of building. Fire was favored by open space; no partitions. Private fire apparatus, standpipes and hose, patent extinguishers. Persons in building, not reported. Means of escape, stairways and street doors. Value of building and contents, $1,000,000. Property loss, $600,000.

FOUNDRIES AND MACHINE SHOPS

December 10, 1916. Marshall, Tex. E. B. Hayes Machinery Co. Austin and Boliver streets. Wholesale machinery and well supplies. Two 2-story buildings destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started supposedly inside of building in rear. Discovered by night watchman about 2:40 a. m. Alarm, telephone. Duration, 2 hours. Stopped after having spread to two other buildings. Fire was retarded by brick walls and metal roof. Firemen handicapped by shortage of men. Persons in building, none. Value of buildings and contents, $60,000. Property loss, not reported to SAFETY ENGINEERING.

January 1, 1917. Mount Gilead, Ohio. Hydraulic Press Mfg. Co. North side of street running east and west. Machine shop and erecting room. Two 1- and 2-story buildings destroyed. Walls, brick. Floors, wood block and cement. Roofs, slate and tar paper. Cause, unknown. Fire started in machine shop. Discovered by workmen about 2:15 p. m. Alarm by telephone. Duration, about four hours. Firemen handicapped by lack of sufficient water pressure. Private fire apparatus, fire hose and chemical extinguishers. Persons in building, 3 when fire was discovered. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $150,000. Property loss, total.

GRAIN ELEVATORS

December 22, 1916. Vestaburg, Mich. Vestaburg Grain Elevator. General elevator. One

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Burning of Christian Brothers College, St. Louis, October 5, 1916. Killed 10. Injured 8. Walls Brick. Floors Wood. Roof Gravel. Fire started on fourth floor about 7:15 a. m. from an unknown cause.

1-, 2- and 3-story building destroyed. Walls, concrete. Floors, hardwood. Roofs, heavy 3-ply roofing. Cause, unknown. Fire started about 6 p. m. Duration, about 2 hours. Fire was retarded by steel walls which forced heat and flame high in the air so that buildings 40 feet distant were saved. Persons in building, none. Value of building and contents, $40,000. Property loss, $15,000.

HOTELS AND LODGING HOUSES

November 25, 1916. Gainesville, Tex. Gilbert Hotel. 103 East Broadway. Lodging and boarding house. One 2-story building de-

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stroyed. Walls, frame. Floors, wood. Roofs, shingle and sheet iron. Cause, leaking gas. Fire started in dining room, between dining room and pantry. Discovered by dining room boys about 5:30 a. m. Alarm, telephone. Duration, 6 hours. Stopped in east wing of the building. Fire was favored by rooms in second story. Persons in building, 50. Means of escape, three stairways. Value of building and contents, $10,000. Property loss, $3,500.

December 4, 1916. Winnipeg, Man. Woodbine Hotel. 466 Main street. Hotel. One 2- and 3-story building partially destroyed. Walls, brick and metal-clad. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started in 2nd flat. Discovered by watchman. Alarm, telephone. Duration, 2 hours. Stopped in same building. Persons in building, one. Means of escape, stairs and fire escapes. Value of building and contents, $26,000. Property loss, $10,400.

December 28, 1916. Mount Holly, N. J. Madison Hotel. Washington street and Madison avenue. Hotel. One 3-story building destroyed; others damaged by explosion. Walls, brick and stucco. Floors, tile and pine. Roofs, slate. Cause, explosion of gas. Fire started in basement. Discovered by noise of explosion about 11:05 a. m. Alarm, telephone. Duration, under control in one hour. Stopped when building was consumed. Fire was retarded by slate roof; metal ceiling and floor fell together. Persons in building, 14. Killed, 3. Injured, 5. Means of escape, inadequate; all guests rescued by employes. Value of building and contents, $25,000. Property loss, $13,000.

HOTELS, RESORT

November 26, 1916. Red Sulphur Springs, Tenn. Red Sulphur Springs Hotel. Summer resort. One 2-story and attic building destroyed. Walls, wood. Floors, wood. Roofs, wood shingles. Cause, supposedly from defective flue. Discovered by proprietor who saw flames issuing from roof between 12 and 2 p. m. No fire department. Duration, two to three hours. Stopped when building was consumed. Fire was favored by height of building and a strong wind. Private fire apparatus, only a well of water which was drawn dry. Persons in building, 15. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, not stated.

INSTITUTIONAL BUILDINGS

December 22, 1916. Wichita, Kan. Kansas Masonic Home. Seneca and Maple streets. Home for wards of Masonic lodges. One 3-story building destroyed—main building. Walls, stone; upper story, wood. Floors, wood. Roofs, slate. Cause, fuel oil; automatic pumps overflowed, oil ignited. Fire started in boiler room. Discovered by boy in charge who fell asleep; was awakened by fire about 1:55 a. m. Alarm, telephone. Duration, about 7 hours. Stopped at east corner of building. Fire was favored by veneer construction. Private fire apparatus, few extinguishers. Persons in building, 104. Killed, 5. Means of escape, by ladder. Value of building and contents, $135,000. Property loss, $100,000.

December 30, 1916. St. Ferdinand, Que. St. Ferdinand de Halifax Insane Asylum. St. Ferdinand and Halifax. Hospital for insane persons. Five 5-story buildings destroyed. Walls, wood. Floors, wood. Roofs, metal. Cause, unknown. Fire started in clothes closet in corner of building. Discovered by opening the closet about 5:45 p. m. Duration, 4 hours. Stopped at next street. Private fire apparatus, fire pump which could not be used on account of extreme cold. Persons in building, 200. Killed, 43. Means of escape, reported good, but difficult to control insane persons. Value of buildings and contents, $2,000,000. Property loss, $58,000.

MANUFACTORIES, MISCELLANEOUS

November 7, 1916. New Orleans, La. Southern Mattress Co. Annunciation and Calliope streets. Mattress factory. One 1-story building damaged. Walls, brick. Floors, cement. Roofs, flat; composition—tar paper and shells. Cause, unknown. Fire started in center of building. Discovered by private watchman outside building about 5:14 a. m. Alarm, regular alarm system. Duration, about 2 hours. Stopped in building where it started. Fire was retarded by walls without opening; other buildings 12 to 25 feet distant. Private fire apparatus, sprinkler system in course of installation, but incomplete when fire occurred. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $25,000. Property loss, $8,000.

MERCANTILES, MISCELLANEOUS

November 18, 1916. Winnipeg, Man. Borbridge Saddlery Co. 468 Ross street. Saddlery and mail order house. One 3-story building partially destroyed. Walls, brick and stone. Floors, wood. Roofs, tar. Cause, dropping of lighted match. Fire started on ground floor. Discovered by employes about 4:45 p. m. Alarm, telephone. Duration, 3 hours. Fire was confined to building. Fire was favored by absence of fire walls. Firemen handicapped by size of building, 40 by 110 feet, with no side windows. Persons in building, 10. Killed, 1. Injured, 4. Means of escape, stairways. Value of building and contents, $80,000. Property loss, $7,000. Employes attempted to extinguish the fire, not observing its rapid spread until escape was almost cut off.

Dec. 11, 1916. Toledo, Ohio. Paddock Merchandising Co. 114-116 St. Clair street. Dealers in wrapping paper and woodenware. One 3-story building destroyed. Walls, brick.

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Home of Donald McKee, Cliffside, N. J., as it appeared the day after a fire. At the time of the fire Mr. McKee's four sons, aged from 1 to 6 years, were in charge of a Japanese servant in the absence of their parents. The oldest boy was awakened by the fire and succeeded in arousing the other occupants of the house. All escaped uninjured.

Floors, wood. Roofs, wood. Cause, overheated floor furnace. Fire started in basement. Discovered by janitor about 6:52 a. m. Alarm, telephone. Duration, 5 hours. Stopped at same building. Fire was favored by poor construction. Firemen handicapped by being obliged to stop fighting fire to rescue 3 men who were buried by falling floor. Persons in building, 1. Killed, 2 firemen. Injured, 2 firemen. Means of escape, fire escape in rear. Value of building and contents, $75,000. Property loss, $70,000.

MERCANTILES, TENANT BUILDINGS

November 1, 1916. Livingston, Mont. Hefferlin block. Main street. Six stores and barber shop on ground floor, 40 rooms (lodgers) in 2nd story. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, wood, metal covered. Cause, unknown. Fire started in a rear room about 2:45 p. m. Alarm, telephone. Duration, 1½ hours. Stopped in attic. Fire was favored by inflammable construction. Firemen handicapped by headway of fire before being discovered. Private fire apparatus, 3-gallon chemical extinguisher in 2nd story. Persons in building, not reported to SAFETY ENGINEERING. Means of escape, 2 front and 1 rear stairway; also ropes in front bedrooms. Value of building and contents, $88,300. Property loss, $20,500.

November 28, 1916. Meridian, Miss. Arky building. Fifth street and 22nd avenue. Jewelry, drug and millinery stores, barber shop,

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offices in 2nd story. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started on ground floor in rear of barber shop. Discovered by policeman about 1:20 a. m. Alarm, telephone. Duration, 4 hours. Stopped in same building. Fire was favored by wood interior construction; no fire doors nor fire walls. Persons in building, none. Injured, 3 firemen injured by falling wall. Means of escape, stairway. Value of building and contents, approximately $65,000. Property loss, $33,000.

December 13, 1916. Hagerstown, Md. Various buildings. W. Antietam street. Laundry, two store rooms, two dwellings (one with saloon attached). Three 1-, 2- and 3-story buildings totally destroyed; two others partially burned. Walls, brick and weatherboard. Floors, wood. Roofs, tin. Cause, unknown. Fire started in laundry building. Discovered by passerby about 3:15 a. m. Alarm, box. Duration, 4½ hours. Stopped at buildings mentioned. Private fire apparatus, small hose line from neighboring factory. Persons in building, 8 in dwellings. Means of escape, fire escape on laundry building. Value of buildings and contents, $65,000. Property loss, not reported to SAFETY ENGINEERING.

January 2, 1917. Logansport, Ind. Park and White hotels, theater, etc. Third street and Broadway. Hotel, garage, shoe shop, butcher shop and theater. Five 2- and 3-story buildings partially destroyed. Walls, brick veneer. Floors, wood. Roofs, tar paper. Cause, supposedly defective boiler. Fire started in boiler room and spread to stage of theater. Discovered by a neighbor about 5:10 p. m. Alarm, fire alarm telegraph. Duration, 6½ hours. Stopped in middle of the block. Fire was favored by poor construction; "an old tinder box remodeled." Persons in building, 40. Injured, chief of fire dept. and one fireman. Means of escape, inadequate. Value of buildings and contents, $30,000. Property loss, $20,000.

January 6, 1917. Marquette, Mich. Two business buildings. Front and Washington streets. Clothing stores, candy kitchen, restaurant, news stand, offices, etc. Two 2-story buildings with basements and sub-basements destroyed. Walls, brick veneer. Floors, pine and maple. Roofs, wood covered with tin, and tar and gravel. Cause, unknown. Fire started near center of block in rear of candy kitchen. Discovered by occupant who noticed smoke about 6:40 a. m. Alarm, telephone. Duration, 24 hours. Stopped at next building west. Fire was favored by dry pine partitions (built in 1868). Building was divided into many small rooms. Persons in building, 40. Means of escape, front and rear stairways. Value of buildings and contents, $47,000. Property loss, not reported to SAFETY ENGINEERING.

January 8, 1917. York, S. C. McNeill building. Main street. Bank, postoffice, hardware and grocery stores, offices. One 2-story building destroyed. Walls, brick, partitions of plaster. Floors, wood. Roofs, tarred felt or paper. Cause, careless disposal of rubbish. Fire started supposedly in boiler room, near rear stairway about 9:30 a. m. Alarm, telephone. Duration, about 3 hours. Stopped in same building. Fire was favored by flimsy construction. Firemen handicapped by falling of front walls on electric wires, putting electric pump out of series and causing reduced water pressure. Persons in building, about 25. Means of escape, ample. Value of building and contents, $30,000. Property loss, not reported to SAFETY ENGINEERING.

MISCELLANEOUS

December 10, 1916. Campbellford, Ont. Dickson Bridge Works Co. Balaklava street. Manufacturing shells. One 1-story building destroyed. Walls, cement and brick. Floors, wood and cement. Roofs, wood. Cause, heating brass bands for shells. Fire started in metal-working section. Discovered by workman about 9 p. m. Alarm, ringing fire bell. Duration, 6 hours. Stopped when building was consumed. Firemen handicapped by being obliged to travel along railroad tracks, and by distant fire hydrants. Private fire apparatus, motor pump and well. Persons in building, none. Means of escape, doors. Value of building and contents, not reported to SAFETY ENGINEERING.

December 21, 1916. Chicago, Ill. Timroth Teaming Co. 2910 Carroll avenue. Teaming contractors. One 1½-story building destroyed. Walls, brick. Floors, wood. Roofs, wood and gravel. Cause, ignition of gasoline while filling tank of car. Fire started in garage. Discovered by foreman about 7:40 p. m. Alarm, telephone. Duration, 6 hours. Stopped at same building. Fire was favored by ordinary construction. Persons in building, 4. Means of escape, doors and windows. Value of building and contents, $134,500. Property loss, $112,000.

December 21, 1916. Richmond, Va. Imperial Coffee Co. 14th and Cary streets. Coffee roasting. Four-story building damaged. Walls, brick. Floors, wood; also wooden joists and girders. Roofs, tin. Cause, unknown. Fire started in second story near center. Discovered by police officer about 11:09 p. m. Alarm, street box. Duration, 4½ hours. Stopped after going through roof. Fire was favored by open elevator shaft and stairway. Firemen handicapped by dense smoke. Persons in building, none. Killed, 1 fireman. Injured, 2 firemen. Means of escape, stairway and elevator near center of building. Value of building and contents, $105,000. Property loss, not reported to SAFETY ENGINEERING.

PAINT, OIL AND VARNISH STOCKS

December 8, 1916. Grand Rapids, Mich. W. C. Hopson building. 25-27 Campau street.

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Fire at No. 21-25 East Houston Street, New York, October 25, 1916. A 7-story factory building. Killed 2. Injured several. A thrilling rescue of a woman by Fireman John Walsh "would win the highest decoration for valor on the European battlefield," the New York *Sun* said. A narration of the rescue: "Swung out across an areaway by a living chain until he could get a purchase on a windowsill of the burning building, Walsh proceeded to mount through flame and smoke three stories to the roof upon the flimsy support of a scaling ladder, secured the hysterical woman, who promptly fainted and became a dead weight in his arms, and perilously made his way, thus burdened, back as he came."

Paints, oils, extracts, storage alcohol. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started near furnace. Discovered by railroad brakeman about 1:42 a. m. Alarm, telephoned by brakeman after traveling a mile. Duration, under control in 1½ hours. Stopped when all but walls of building was consumed. Fire was favored by wood partitions, open elevator shaft and stairway. Firemen handicapped by electric wires interfering with raising water tower. Persons in building, none at time of fire. Injured, 2 firemen slightly hurt. Means of escape, fire escape on rear of building. Value of building and contents, $86,500. Property loss, $78,300.

PRINTERS AND BOOKBINDERS

January 9, 1917. Troy, N. Y. Troy *Observer* building. 285-289 River street. Stores on ground floor, offices and plant of *Obesrver* in 2nd story and Odd Fellows' lodge rooms in 3rd story. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in fish market on ground floor. Discovered by policeman about 9:55 p. m. Alarm, street box and telephone. Duration, about 11 hours; "watch stream" continued until January 12. Stopped at same building. Fire was favored, as building was very old; walls bulged; only a part actually fell. Firemen handicapped by explosion which spread fire to all parts of the building. Persons in building, probably 200; Odd Fellows' meeting in session. Injured, no occupants. Means of escape, doors and fire escapes. Value of building and contents, $150,000. Property loss, $70,000. The explosion sent flames across the street burning and injuring about 30 persons, including firemen, policemen and spectators.

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Third Floor of No. 21-25 East Houston Street, New York, after the fire of October 25, 1916. The building was not equipped with automatic sprinklers.

SCHOOLS AND COLLEGES

January 7, 1917. Dallas, Tex. Fannin school in East Dallas. San Jacinto and Fitzhugh streets. Public school. One 3-story building destroyed. Walls, brick. Floors, wood and concrete. Roofs, composition roof of tar, gravel and paper. Cause, incendiary. Fire started on stairway in 2nd story. Discovered by neighbor about 2:35 a. m. Alarm, Gamewell system. Duration, 8 hours. Fire was confined to upper floors. Persons in building, none. Means of escape, 3 stairways. Value of building and contents, $46,000. Property loss, $14,500. This was one of seven buildings fired by a "firebug" between 12:30 and 2:15 a. m. one night. Other buildings were garages and servants' quarters in same neighborhood. Total losses, about $20,000.

January 9, 1917. Bristol, Pa. Holy Ghost Apostolic College. Turnpike road, Cornwells, Pa. Catholic college. One 4-story building damaged. Walls, stone. Floors, wood. Roofs, slate. Cause, unknown. Fire started under stairway. Discovered by a student about 1:30 a. m. Alarm, telephone. Duration, short time only. Stopped near place of origin. Fire was retarded by substantial construction. Persons in building, 100. Means of escape, ample stairways. Value of building and contents, $100,000. Property loss, $1,000.

SLAUGHTER AND PACKING HOUSES

November 23, 1916. Tacoma, Wash. Carstens Packing Co. Tide flats (no street number). Meat packers. One 3-story building damaged, two 1- and 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, overheated wool and hair drying room. Fire started in drying room. Discovered by workmen about 2:50 p. m. Alarm, telephone. Duration, under control in 1½ hours. Stopped at main building. Fire was favored by cheap construction. Firemen handicapped by difficulty of access; narrow passageways and no way to reach the rear of the buildings. Persons in buildings, 285. Means of escape, wooden fire escape on main building. Value of buildings and contents, approximately $200,000. Property loss, about $50,000.

STABLES

January 7, 1917. Melrose, Mass. Stable of R. Philpott. Dell avenue. Contractor. One 2½-story building destroyed. Walls, wood. Floors, wood. Roofs, shingle. Cause, oil stove overturned. Fire started in office on ground floor. Discovered by occupants of

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room about 2:15 a. m. Alarm, telephone. Duration, 3 hours, 45 minutes. Stopped in building where it started. Fire was favored by wood construction. Persons in building, 4. Injured, 2. Means of escape, doors on street floor. Property loss, $6,000.

THEATERS AND AMUSEMENT PLACES

January 8, 1917. Kansas City, Mo. Willis Wood Theater. Baltimore avenue and 11th street. One 3-story building partially destroyed. Walls, brick. Floors, concrete. Roofs, concrete. Cause, unknown. Fire started on stage. Discovered by watchman about 12:50 a. m. Alarm, telephone. Duration, about 3 hours. Fire was practically confined to stage. Fire was prevented from spreading by substantial construction of building. Private fire apparatus, standpipe and chemical extinguishers. Persons in building, 1. Means of escape, incline chutes and fire escapes. Value of building and contents not reported to SAFETY ENGINEERING. Property loss, $50,000.

WOODWORKERS

November 13, 1916. Tacoma, Wash. Hague box factory. Two miles outside city limits, four miles from business section. Manufacturing wooden boxes. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in shed attached to factory building. Discovered by employes about 8:55 p. m. Alarm, telephone. Duration, one hour. Stopped when building was consumed. Fire was favored by wood construction. Firemen handicapped by traveling 4 miles; no fire hydrants. Persons in building, none. Means of escape, one-story building. Value of building and contents, $5,000. Property loss, total.

December 2, 1916. Conrad, Mont. Power-Wilson Co. Fourth avenue, railroad right-of-way. Implements. One 2-story building destroyed. Walls, wood and sheet-iron. Floors, wood. Roofs, patent roofing. Cause, unknown. Fire started in center of building. Discovered by night marshal about 4 a. m. Duration, 4 hours. Fire was favored by poor construction Private fire apparatus, chemicals. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, approximately $40,000. Property loss, total.

December 14, 1916. South Bend, Wash. Kleeb Lumber Co. Quincy street. Sawmill. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, tar paper. Cause, unknown. Fire started in west end of building. Discovered by night engineer about 12:30 a. m. Alarm, telephone. Duration, 3½ hours. Stopped 40 feet from end of building. Fire was favored by dust and oil. Firemen handicapped by lack of sufficient hose. Private fire apparatus, steam fire pump. Persons in building, 3. Means of escape, good. Value of building and contents, $250,000. Property loss not reported to SAFETY ENGINEERING.

January 5, 1917. Joliet, Ill. Illinois State prison. 1900 Collins street. Chair factory. Two 2-story buildings destroyed. Walls, stone. Floors, wood. Roofs, wood. Cause, unknown. Discovered by watchman about 5:30 p. m. Alarm, Gamewell system. Duration, 6 hours. Stopped at 2nd building. Fire was retarded by stone walls. Private fire apparatus, prison's own fire department. Persons in building, none. Means of escape, stairways. Value of buildings and contents not reported to SAFETY ENGINEERING.

A Letter From Mr. Arne Fisher

Editor SAFETY ENGINEERING: I beg to enclose a corrected copy of my address on Bayes' Rule. You will, among other things, notice that your printer has left out the horizontal bar over certain numbers indicating negative characteristics in logarithms. Hoping you will take pains to make the necessary corrections in a future number of your magazine, I beg to remain, yours faithfully,

Newark, February 23. ARNE FISHER.

In the December number an article by Mr. Fisher was published on pages 368, 369 and 370, being a note on the application of Bayes' Rule, read before the Casualty Actuarial and Statistical Society of America, and taken by SAFETY ENGINEERING from a proof sheet furnished by the society. Mr. Fisher's note has since been reprinted in pamphlet form and all persons interested in his formulas will probably be able to obtain a copy by addressing him at the office of the Prudential Insurance Company, Newark, New Jersey.—EDITOR.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

FIRE STOPS

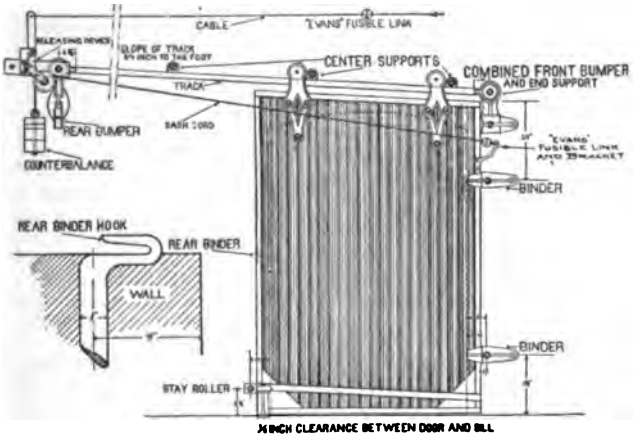
The National Fire Protection Association, in its regulations for the protection of openings in division walls between separate buildings or sections of buildings, on the occasion of its nineteenth annual meeting, made the following statement.

"The great importance of fire walls as a safeguard to life and in preventing the spread of fire, and the fact that they are liable to be severely exposed to fire for considerable periods, make it essential that all openings in such walls be protected by the most efficient methods."

Its Class A listing applies only to fire retardants of the best type, and in respect to fire doors for openings in fire walls, they state that "only such fire retardants are included in this class (Class A) as have been shown by experience and tests to furnish a high degree of fire protection when installed on both sides of walls and if used as exit doors except as otherwise noted, to offer no serious accident hazard under normal or emergency conditions in this situation.

Any fire door which has received the approval of the Underwriters' Laboratories of Chicago, when installed to fully meet the requirements of the Insurance Inspection Bureau having jurisdiction, will entitle the owner of the property to a reduction in his insurance rate; but this reduction is based on how efficiently the openings in the fire or division walls have been protected, because if the Underwriters have not extended their Class A approval to the fire door that may have been installed the reduction in the rate will not be as large.

It is to be further noted that fire doors labeled or listed by the Underwriters' Laboratories in Class A are not necessarily uniform in quality or merit, and, consequently, while various kinds of fire doors may have



¼ INCH CLEARANCE BETWEEN DOOR AND SILL

received Class A Approval, which merely indicates compliance with Underwriters' requirements, some of these fire doors may be better made or more durable or possess features of superiority to other products in the same class.

It is now generally admitted that fire doors made of two sheets of galvanized corrugated steel or iron and lined with asbestos paper, are superior to the standard 3-ply tin-clad fire doors that have been on the market for so many years; and this is recognized by the Underwriters' Laboratories in their official statement that "standard tin-clad fire doors with 3-ply wood cores are fairly substantial

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in construction, practical under most conditions, easy to install, etc. . . . but under adverse conditions of service they are liable to deteriorate rapidly and are difficult to maintain;" whereas in their official statement regarding sheet metal fire doors of the type above mentioned they say that such doors are not only fairly substantial in construction, practical under most conditions and easy to install, but are "durable and easy to maintain."

The Evans "Almetl" Fire Door, for which patents are pending, has not only received the Standard Class A Approval from the Underwriters' Laboratories of Chicago (covering the "Stock" Insurance field) but has also been Approved by the Factory Mutual Laboratories of Boston, and is therefore fully approved or recognized by all insurance interests.

This door is made by Merchant & Evans Co., one of the oldest and largest metal concerns in the country, having plants in Philadelphia, Wheeling and Chicago, and numerous offices and warehouses. The concern is now rounding out its fiftieth year in business. It has established over 170 experienced contracting and erecting licensees throughout the United States to handle its "Almetl" Doors, and its "Almetl" Fire Shutters (which are also approved).

The Evans "Almetl" Fire Doors and Shutters, in addition to the approvals from the Boston and Chicago Laboratories, have been endorsed, accepted or recommended by many national, State and municipal authorities, as well as architects and engineers, and many large installations have been made in important buildings.

It is claimed by the makers that compared to the standard 3-ply tin-clad fire doors, the "Almetl" product is much lighter, far stronger, better looking, easier to install, more rigid, and very much more durable. The chief defect of the tin-clad fire door is the tendency of the wood core to dry rot, whereas the "Almetl" door has no wood to rot and no thin tin covering to bruise. All construction is visible. The edges of the door are strongly reinforced.

PROTECTING YOUR FACTORY FROM FIRE

Under the above title the Pyrene Manufacturing Company has published a manual on fire prevention for industrial plants prepared by Chief Guerin, the former head of the New York City Fire Prevention Bureau.

The table of contents includes: How to Organize a Fire Drill in Your Factory, The Fire Brigade, Fire Prevention, Fire Protection, Common Hazards, Special Hazards, Exposures, Housekeeping, Exits and Fire Escapes, Care of Fire Appliances, Construction, Inspection Forms.

Industrial Fire Prevention safety officials and others interested in industrial fire prevention will find Chief Guerin's new book a valuable help in securing a correct idea on the most approved methods of safeguarding industrial plants against fire damage. Chief Guerin has used simple language, and what he says is readily understood. Without figures of speech the author goes right to the heart of the subject, telling what is needed to be done to make the factory a safer place for the employes to work in. The instruction given for the organization of fire drills and fire brigades brings up a most important subject. Fire drills and fire brigades should be established in all industrial plants. The chapter on blank forms for the use of the watchman, inspector and fire chief for making reports on fires and fire drills is also valuable. The fact that Chief Guerin was chosen to be the organizer of the Fire Prevention Bureau of the New York Fire Department is sufficient evidence that he is considered an authority in the field of Fire Prevention.

Copies of this manual can be obtained from the Pyrene Manufacturing Company, 52 Vanderbilt Avenue, New York City, at a cost of $1.00.

UNDERWRITERS' LABEL ON AUTOMOBILE LOCK

The magnitude of the theft losses on automobiles is so well understood among insurance men that no comment on it is needed here. The urgent need for a remedy, both from the standpoint of the insurance man and that of the car owner, became apparent two or three years ago. An early result was that inventors possessed of varying degrees of skill and ingenuity began to give thought to the development of locks suitable for automobiles. It was not long before the market supply left little to be desired so far as number and variety of automobile locks were concerned, and insurance men and public safety officials began to be constantly importuned for their endorsement of this type of lock or that.

Some eighteen months ago, the services of Underwriters' Laboratories were enlisted, the need of advices from unbiased technical experts as to the correctness of the claims of inventors and manufacturers having become urgent. It is stated that since then samples of nearly a dozen different types of locks have been formally submitted to the laboratories for examination and test; following these examinations and tests, more than half of the submittors have been listed as manufacturers prepared to furnish automobile locks suitable for the purpose intended.

While this investigation of sample locks has unquestionably brought about improvement in the quality of locking devices available, a condition remains that ought to be remedied, and which it ought not to prove difficult to remedy.

Each of the manufacturers submitting sample locks for investigation has entered into the usual agreement to the effect that opportunity would be given for the Laboratories to employ its system of inspection at the factory and

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labeling of locks intended to be sold as approved devices. But it appears now that in the very large sale of locks going on throughout the country at this time, the locks provided are very generally locks which the Laboratories' representatives have never had an opportunity to see at all, although they are made by manufacturers listed as equipped to make an approved product.

The remedy for this condition is apparent. It must not be forgotten that laboratory tests on sample products by the Underwriters' Laboratories is but the first step toward securing the information that is needed. To make these tests of lasting value it has been found that they must be followed up with suitable methods of subsequent inspections and proper service value determinations.

Where the lock offered for sale does not bear the label, there is lacking the necessary evidence that it is of the standard type. If the label is absent, the lock is either one that has not been inspected at all by the Underwriters, or one that has been rejected as not being suitable. The label on the lock itself is the evidence that the lock has been properly inspected at the factory and that it has been passed by Underwriters' Laboratories. This label is either in the form of a narrow strip of metal attached permanently to the lock bearing the words "Underwriters' Laboratories Inspected Automobile Lock" or it is stamped in some convenient part of the lock body, with the first three words abbreviated. When those interested in the proper performance of locking devices adopt the practice of asking to be shown the label as evidence of suitability, the condition described will, it is safe to assume, be speedily corrected. It may be expected to continue until this practice becomes the rule.

NEW UNIVERSAL DANGER AND CAUTION EMBLEM

The Safety First Supply Company, Pittsburgh, Pa., announces that it has ready for distribution the new Universal Danger and Caution Emblem adopted by the National Safety Council at the last annual safety congress. This new sign is manufactured of porcelain enamel and the manufacturer guarantees it against deterioration. It is made in two sizes, namely, 12 inches square and 6 inches square.

Among the recommendations made by the National Safety Council in using this sign are the following: This emblem must always be kept free from defacement by words, sign or character of any nature. The word "Safety" or its translations or synonyms shall not be used in conjunction with the danger emblem. When the necessity for displaying the danger emblem has ceased to exist the emblem must be removed. Such words often carry a suggestion exactly opposite to the purpose for which the danger emblem is intended.

Further particulars can be obtained from the Safety First Supply Company, Pittsburgh, Pa.

MARYLAND CASUALTY COMPANY

The prevention of industrial accidents is a subject of deep importance to the compensation insurance companies, and several large institutions writing compensation business are making a special feature of supplying expert safety advice to their policyholders on how accidents can be prevented in industrial plants.

Among the leaders in this constructive work is the Maryland Casualty Company, which maintains a safety engineering department whose advice and service are always at the disposal of the policyholders of this company. The company maintains a safety museum, including the principal devices and apparatus for preventing industrial accidents at its home office in Baltimore, Md.

The old idea of merely settling a claim is rapidly disappearing. Modern progressive compensation insurance furnishes not only the financial ability to meet a loss, but also the service for preventing accidents, and this is what wide-awake employers today are demanding. This insurance safety engineering service is doing a commendable work in the industries and is an important factor in reducing the accidents in industry.

SPRINGFIELD F. & M. INS. CO.

The annual statement of the Springfield Fire & Marine Insurance Company, Springfield, Mass., recently issued, shows a very successful achievement by this company during the past year.

President Damon announces the following figures which indicate a healthy increase in total assets, premiums written and reinsurance reserve.

Total assets.....	$11,961,976	Inc.	$266,602
Premiums written.	6,823,926	"	710,009
Reinsurance res've	6,159,662	"	486,333

Since organization in 1849 the Springfield has paid $68,836,946.84 to its policyholders.

AETNA INSURANCE COMPANY

The annual statement of the Aetna Insurance Company of Hartford, Conn., for the year ending December 31, 1916, shows that this great fire insurance company has completed another splendid year for its policyholders and stockholders.

In the 98 years of its existence the Aetna Insurance Company has paid in losses the stupendous sum of $157,580,593.27. The advance this company has made during 1916 is shown by the following figures:

Increase in assets.....	$1,975,944.35
Increase in surplus.....	918,808.94
Increase in reinsurance fund and other liabilities	1,057,135.41
Gain in net premiums....	1,128,458.93
Gain in market values....	142,369.58

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Plant of the Standard Optical Company at Geneva, N. Y.

NEW SAFETY GOGGLE

The Standard Optical Company, Geneva, N. Y., is now introducing a new safety goggle known as the "Stoco."

This company is a prominent manufacturer in the optical industry, operating a large plant at Geneva, N. Y. The fact that this concern is now manufacturing an industrial eye protector is another indication of the importance which the industrial eye protection industry has assumed. The production of industrial eye protectors is now one of the most important of the safeguard industries.

The "Stoco" goggle is different in design from the leading types of industrial eye protectors now on the market, and the manufacturer announces this goggle is intended to meet requirements of industrial workers where a colored lens is not required. Due to its design it needs no adjusting.

UNDERWRITERS' LABORATORIES

Recent Approvals and Reapprovals

WIRED GLASS. Mississippi Wire Glass Co., Mfr., for use in standard fire window frames.

PORTABLE FIRE ESCAPE. Jersild Fire Escape Co., Mfr., Neenah, Wis.

"PROTECT-A-LITE" GAS GLOBE. The Safety Wire Gas Globe Co., Mfr., 82 West State Street, Columbus, Ohio. Wire globe, designed for use with gas burners.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Burton Co., W. J., Mfr., corner Junction and Leavitt Streets, Detroit, Mich.

SLIDING OR SWINGING, TIN-CLAD FIRE WALL DOOR. Cox Co., H. F., Mfr., 601 Ottawa Avenue, N. W., Grand Rapids, Mich.

SWINGING, HOLLOW METAL, VERTICAL COMMUNICATION DOOR. Central Metallic Door Co., Mfr., 2414 West 22nd Street, Chicago, Ill.

SWINGING, SHEET-METAL SHUTTER. Saino Fire Door Mfg. Co., F. L., The, Mfr., Colorado and Kentucky Avenues, Memphis, Tenn.

SWINGING, METAL-CLAD, VERTICAL COMMUNICATION DOOR. Westergren, Inc., M. E., Mfr., New York, N. Y.

WIRED GLASS. Sergeant Glass Co., Mfr., Burrows, Pa. Factory at Sergeant, Pa. Wired glass for use in standard fire window frames.

WIRED GLASS. Western Glass Co., The, Mfr., Streator, Ill. Wired glass for use in standard fire window frames.

ROLLING STEEL SHUTTERS. Wilson Corporation, J. G., Mfr., Norfolk, Va. Manually operated single, rolling steel shutters.

SWEEPING COMPOUND, "Tupaco." Turner Papers Co., Mfr., 320 E. Broad, Texarkana, Ark., Tex.

TEST UNIT FOR LOWE AUTOMATIC FIRE DOOR RELEASE. Lowe Mfg. Co., Mfr., Plainfield, N. J.

FIRE WINDOW FRAMES. Pullman Mfg. Co., Mfr., Rochester, N. Y. Unit sash balances for sliding type.

HOLLOW METAL FIRE WINDOW FRAMES. Biersach & Niedermeyer Co., Mfr., 216 Fifth St., Milwaukee, Wis.

HOLLOW METAL FIRE WINDOW FRAMES. Dillon Co., W. E., Mfr., 183 George St., Toronto, Can.

HOLLOW METAL FIRE WINDOW FRAMES. Moeschl-Edwards Corrugating Co., The, Mfr., Covington, Ky.

INSIDE, HAND-OPERATED, DISCHARGE DEVICES. Crescent Mfg. Co., The, Mfr., 771 Mather St., Chicago, Ill.

INSIDE, HAND-OPERATED, DISCHARGE DEVICE. Western Oil Pump & Tank Co., Mfr., 2437 Kosciusko St., St. Louis, Mo.

"MALTHOID CEMENT PAINT." The Paraffine Paint Co., Mfr., 34 First St., San Francisco, Cal.

OUTSIDE, HAND-OPERATED, DISCHARGE DEVICE. Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

SASH LOCKS FOR SLIDING WINDOWS. Russell & Erwin Division, American Hardware Corp., Mfr., New Britain, Conn.

SLIDING OR SWINGING, SHEET METAL FIRE WALL DOOR. Consolidated Sheet Metal Works, Mfr., 661 Hubbard St., Milwaukee, Wis.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Minnesota Roofing & Cornice Works, Mfr., 133 Twelfth St., St. Paul, Minn.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Norman-Seton, Inc., Mfr., Winfield, L. I., N. Y.

SWINGING, HOLLOW METAL, EXTERIOR WALL DOOR. Central Metallic Door Co., Mfr., 2412 W. 22nd St., Chicago, Ill. National Automatic Door Co., Chicago, Ill., submittor.

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SAFETY ENGINEERING

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Sanitation in Great Industrial Plants

Recommendations and Suggestions by the Sanitation Committee of the United States Steel Corporation

Editorial Note:—General requirements for sanitary installations have been prepared by the Sanitation Committee of the United States Steel Corporation, as a result of the experience of subsidiary companies and of the committee in matters pertaining to sanitation. The information published by the Sanitation Committee is to be used as a guide in standardizing sanitary equipment in order to insure the provision of efficient sanitary facilities and proper sanitary conditions at the time construction work is planned; also it is the intention that present equipment shall be made to conform to the suggestion (as may be practicable), whenever replacements and repairs are required. The Sanitation Committee recommends that each subsidiary company prepare and adopt its own detail specifications and standard design of equipment conforming with the general requirements. The principles of sanitary design and requirements for substantial construction, the Sanitation Committee says, do not necessarily involve expensive or elaborate details. Such construction is entirely out of place in installations for mill buildings, shops and yards, and should be avoided. All legal requirements, such as local building codes, city ordinances, plumbing regulations, etc., should be observed, and if there is any direct conflict between the Sanitation Committee's requirements and such legislation, the latter should, of course, control. The requirements approved by the Sanitation Committee of the United States Steel Corporation are printed in italics; the comments in ordinary type are explanatory.

WATER CLOSETS.

Location.

1. *Closets should be located as conveniently as possible to work.*

While due regard should be given to convenience of location to avoid loss of time, employes should not be unnecessarily exposed to weather conditions or accident hazards en route.

2. *There should be a number of small installations rather than a few large ones.*

This is recommended so that available space in mill buildings may be utilized. If closets are conveniently located there will be less time lost and employes will be relieved promptly, which promotes good physical conditions.

3. *Each toilet room should be so located as to open to outside light and air.*

The committee does not approve of installations removed from outside light and air, but realizes that under certain conditions, due to congestion, it would be impossible to comply with this requirement. In confined situations, where side windows would not give sufficient light and ventilation, roof lighting and roof ventilating may be preferable. Where closets must be installed with little or no light and ventilation from either side windows or roof, effective artificial lighting and forced draft ventilation should be provided. Wherever possible

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roof ventilation should be provided for all installations.

Construction of Building.

4. *The minimum amount of window space for a toilet room containing one fixture must be* 4 *square feet; and for each additional fixture an addition of* 2 *square feet of window space must be made. These windows must be so constructed that they can be opened to give adequate ventilation to the room.*

5. *Each toilet room should have not less than* 10 *square feet of floor space and not less than* 100 *cubic feet of air space for each fixture installed.*

Interior Finish of Building.

6. *Walls should be of non-absorbent material with a smooth surface, not only to facilitate cleaning, but to avoid defacement. They should have cove corners.*

Explanation as noted under 7 applies to walls.

7. *Floors should be constructed of tile or concrete, with a smooth surface. The material should be non-absorbent.*

Concrete or cement with smooth, hard surface is considered satisfactory material, except for special installations, where a more elaborate finish may be desired. The materials may be made non-absorbent by proper care in construction of mixtures and the use of compounds applied to the concrete after it has been laid.

8. *Closets should be separated from locker and wash rooms by partitions or other means.*

To secure privacy and to produce the best sanitary conditions in wash and locker rooms where employes leave their personal belongings while at work.

9. *Walls and partitions preferably should be of light color to increase illumination and to facilitate cleaning.*

10. *Toilets should be adequately heated in cold weather.*

11. *Heating facilities should be arranged to permit proper cleaning of floors and walls.*

12. *Hose connection should be provided.*

To facilitate cleaning by providing means for thoroughly flushing and scrubbing room and equipment.

Number of Fixtures.

13. *Number of seats should be not less than one to every* 15 *persons, based upon the maximum number of employes in a turn in departments using the unit.*

14. *An adequate number of urinals should be provided in each closet room.*

It will be noted under requirement "32—*Urinals*" that separate urinals are to be installed at convenient places throughout mill buildings. Where this is done at least one urinal should be installed in each closet room to discourage the unsanitary practice of using closets as urinals.

15. *Unless wash rooms are in close proximity to closet, each closet room should be supplied with at least one washing faucet.*

The installation of a washing faucet in a closet room, not in close proximity to a wash room, is to promote personal cleanliness by encouraging men to wash after using these facilities.

Character of Fixtures.

16. *Closets should be of individual bowl type with individual water seal, and should be made of porcelain or vitreous china, and not of enameled iron.*

Flush range closets, used more or less extensively before the organization of the Sanitation Committee, are considered unsanitary and similar to an open sewer. Enameled iron, of which the ranges are most commonly made, soon corrodes, leaving the equipment in a deplorable condition, and flushing feces under others using the range, is unsanitary, disagreeable and objectionable. Individual closets made of porcelain or vitreous china overcome the objectionable features and provide a sanitary, durable, neat-appearing bowl, which can be thoroughly cleaned.

17. *The seat of each water closet should be made of wood or other non-heat absorbing material, coated with varnish or other finish which will make it impervious to water. Under no circumstances should the use of seats made of enameled ironware, porcelain or other similar heat-absorbing material be allowed.*

The use of non-heat absorbing material for seats eliminates any harmful

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effects which might come from men sitting on a cold surface.

18. *The size of the opening should be at least 7 inches in width and 11 inches in length.*

This size is recommended to insure the maintenance of a clean seat.

19. *There should be partitions between the seats, preferably of steel construction, painted or enameled, 6 feet in height and 12 inches off the floor.*

An employe is entitled to a certain amount of privacy.

20. *Distance between partitions should be not less than 30 inches, and distance from front of seat to door not less than 30 inches.*

These dimensions are considered ample to permit of a man using the equipment comfortably.

21. *Partitions and bowls should be so arranged that entire space behind and below the seat can be easily cleaned.*

22. *Doors should be not less than 20 inches in height. If of this dimension, the lower part of the door should be placed 24 inches above the floor.*

This door is provided for privacy. It should be equipped with spring hinges, and open outward or swing.

23. *Clothes hooks should be provided.*

24. *Toilet paper with proper holders should be furnished by the company.*

If toilet paper is provided there is less danger that sewers will be clogged with material such as waste, newspapers, etc., carried into the water closet by workmen.

25. *Regular and thorough cleaning should be instituted; reliance upon disinfectant is not sufficient.*

This refers to disinfectants or deodorizers used in drip-cans or sprinkled on the floor. Thorough scrubbing with soap and water is the most efficient method of cleansing. The use of a germicide following scrubbing is not objected to.

26. *A special attendant should be appointed.*

This means a man who devotes sufficient time to keeping the sanitary installations clean and in good order. Large installations may require the entire time of an attendant, but one man can probably take care of several small installations.

The mere providing of sanitary equipment is not sufficient; it should be maintained in a manner to make it attractive and inviting.

CONSTRUCTION OF CLOSETS WHERE THERE IS NO SEWERAGE SYSTEM.

Requirements.

27. *There should be sufficient light.*

There should be sufficient light in the closet to insure cleanliness, but the vault or other receptacle, provided for feces, should be protected as thoroughly as possible against the entrance of flies and other germ-carrying insects. The building should be provided with tight-fitting doors opening inward and equipped with spring hinges, so that the normal position would be closed. Windows and ventilators should be screened.

28. *There should be proper ventilation.*

This should include both vault and room ventilation.

29. *The hole in the seat should be at least 7 inches in width and 11 inches in length.*

This size is recommended to insure the maintenance of a clean seat.

30. *For each hole there should be a close-fitting cover.*

Persons using the closet should be encouraged to keep the seat covered to prevent flies and other germ-carrying insects coming in contact with the feces.

31. *All privies should have provisions for cleaning.*

This refers to the removal of feces, and the necessary arrangements should be considered when the closets are built.

URINALS.

Requirements.

32. *An adequate number of separate urinals should be placed throughout mill convenient to place where men work.*

This will avoid loss of time required for a man to walk some distance to relieve himself.

33. *Troughs and basins should not be used for urinals. The wall or vertical slab urinal with proper flushing should be used; preferably the porcelain stall.*

The design and use of plant-made urinals for general mill purposes is en-

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couraged, provided non-absorbent and non-corrosive material is used. Concrete is satisfactory if well made and the correct mixtures used to give non-absorbing qualities. All perforated flush pipes for flat panel urinals should be designed to avoid stoppage by rust or sediment and so arranged that the water cannot flow or drip without washing the entire face of the panel. Where continuous flushing is not practicable, the periodic flush tanks should operate at such intervals as to keep the entire panel wet, clean and free from odor.

34. *There should be protection around the urinals to secure privacy.*

There should be a suitable enclosure around the separate fixture to ensure privacy, but not of such character that sufficient light for inspection and thorough cleaning and ventilation is prevented.

35. *Floor in front of urinal should slope to drain.*

The floor in front of urinal should, in every case, be of smooth non-absorbent material, sloped towards the drain, and should preferably be constructed as a narrow standing raised about three inches above the floor. The raised floor will insure the proper position of the person using the urinal.

WASH AND LOCKER ROOMS.

Location.

36. *Wash rooms should be located in places most convenient to the men to be served; if possible along route when going from work and without exposure to the weather.*

37. *So far as possible they should be located in places where the men are least exposed to accident while en route, such as crossing railroad tracks, roll trains and other dangerous places.*

38. *They should preferably be located in a separate building, or if within a building, they should be enclosed.*

Men should be encouraged to wash and change their clothing before leaving the plant. An enclosure for the washing facilities, located within a mill building, is recommended, so that street apparel will not be exposed to the dirt from the mill. Wash rooms should be in the same building as the locker room, to obviate the inconvenience of traveling any distance for change of clothing.

39. *They should open to outside light and air.*

See "Location 3."

Construction of Building.

40. *If a separate structure, the building should be of substantial fire-resisting construction.*

While fire-proof construction is recommended, there is no objection to construction conforming to that of other plant buildings.

41. *Wash and locker rooms located in the same building with toilet should be completely separated by partition. These rooms may be joined by swinging or self-closing doors. It is preferable that wash and locker rooms should be separated by partitions.*

To prevent steam and moisture escaping from wash room to locker room and wetting the clothes in the lockers; to insure the best sanitary conditions in places where employes leave their personal belongings while at work.

42. *The rooms should be of sufficient size to allow men to use equipment conveniently, without interference with each other.*

Interior Finish of Building.

43. *Floors and walls should be of concrete, or non-absorbent material. Floors should slope toward the drain.*

Concrete or cement with smooth hard surface is considered satisfactory in all cases, except for special installations where a more elaborate finish may be desired. The material can be made non-absorbent by proper care in construction of mixture and by the use of compounds applied to the concrete after it has been laid.

44. *Drain should be located under equipment so that water will run toward and not away from fixtures.*

45. *Walls, ceilings and partitions should be light in color to give a neat appearance, increase illumination and facilitate cleaning.*

46. *Sufficient window space should be provided to afford adequate light and ventilation.*

Too much importance cannot be attached to the liberal admission of sun-

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light—"the most efficient of all germicides."

47. *Rooms should also be adequately lighted artificially. Light should be so distributed that fixtures will be thoroughly lighted and no dark corners will exist.*

48. *The room should be provided with adequate and suitable heating facilities.*

49. *Heating pipe or radiators should be so installed as to give ample space below and behind same for cleaning purposes.*

50. *Permanent hose connection should be provided for thoroughly flushing and cleaning rooms.*

Fixtures.

51. *No wash basins or troughs for common use should be installed. Facilities for washing hands and face should be such that employes must necessarily wash from the flowing stream.*

The wash basin with stopper is unsanitary. This requirement is designed to prevent the transmission of disease through the common use of a washing fixture made to contain water.

52. *Fixtures for washing the hands and face should be so spaced that a man can wash without splashing his neighbor.*

53. *The number of faucets for washing hands and face should be not less than one to every 6 employes, based upon the maximum number employed on a single turn in the department using the equipment. Regular showers may be substituted in part for these faucets.*

54. *Both hot and cold water should be provided for each fixture.*

55. *Clothes hooks should be provided.*

Lockers.

56. *A locker or other method of caring for change of clothing, etc., should be provided for each employe who has a fixed place of work.*

Clothes lockers should be located in buildings or enclosures in conjunction with washing facilities.

57. *Lockers should be of steel and have proper ventilation. They should be at least 4 inches off the floor.*

To facilitate cleaning without contaminating locker.

58. *Size of lockers should be not less than 12 inches by 15 inches floor space.*

Showers.

59. *The number of showers should be not less than one to every 25 employes, based upon the maximum number employed on a single turn in the department using the equipment.*

This proportion may be varied according to the character of the work.

60. *Each shower should be separated by partition.*

To encourage men to use the showers, who would otherwise not do so.

To prevent the user splashing his neighbor.

61. *The enclosure should be finished in a light color to give a neat appearance and facilitate cleaning.*

62. *Showers should have hot and cold water and be equipped with a hot and cold water regulating valve.*

The system should be arranged to prevent scalding. This does not necessarily imply the need of a thermostatic control for each shower in a battery of showers. Where such automatic control is necessary it can ordinarily be attached to the heater.

63. *Regulating device should be so located that it can be operated without standing under the shower.*

64. *Supply pipes to showers should be placed overhead to avoid the possibility of a person coming in contact with the hot pipes, and to facilitate the cleaning of the shower enclosure.*

Care.

65. *Special men should be delegated to attend to cleaning of wash rooms.*

This means a man who devotes sufficient time to keeping the sanitary installations clean. Large installations may require a special attendant, but one can probably take care of several small installations.

The mere providing of sanitary equipment is not sufficient; the equipment should also be maintained in a manner to make it attractive and inviting.

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DRINKING WATER.

Requirements.

66. *Fountains should be located convenient to where men work.*

67. *They should be made attractive, should be preferably white in color, and should be kept clean.*

68. *They should be so designed as to make it impossible for a person drinking to put his lips on the outlet for water.*

69. *They should be so constructed that of necessity a person must drink from a stream or jet, not from an overflowing bowl.*

[Investigation shows that when fountains are installed of a type that allows a person to put his lips to the outlet for water, many people do put their mouths over the end of the nozzle and drink from it in a sucking fashion. This is an unsanitary practice and may be the means of spreading disease.]

70. *They should be so arranged that waste water will be carried away without slopping.*

RECOMMENDATIONS MADE BY THE SANITATION COMMITTEE THAT SHOULD BE CONSIDERED AS A PART OF THESE GENERAL REQUIREMENTS:

1. Each subsidiary company is to make a bacteriological analysis of all water used for drinking purposes at least once a year; or oftener if necessary, where there is any question as to the purity of the drinking water supply, and also that a permanent record be kept of all such analyses made.

[Sanitation Committee's recommendation of April, 1912.]

2. The use of the common drinking cup in offices of the United States Steel Corporation, and in offices, mills and works of its subsidiary companies should be discontinued as soon as, and wherever practicable, and it is recommended that there be substituted as soon as practicable, conveniently located, sanitary drinking fountains.

[Sanitation Committee's recommendation of December 22, 1913.]

3. As the roller or common towel is a prolific source of disease, its use should be abolished and the individual or hand towel substituted. This applies to all towels furnished by the companies. The use, in common, of towels furnished by the employes themselves should be prohibited.

[San. Com. rec., Dec. 19, 1912.]

Theaters and Motion Picture Theaters

REQUIREMENTS for architects and builders regarding construction, alteration or repair of theaters and motion picture theaters, issued by the Department of Labor and Industry of the Commonwealth of Pennsylvania:

GENERAL REQUIREMENTS

Location to be made suitable for the purpose: No steps allowed at entrance or exit openings other than one of 8-inch rise to keep out weather conditions. Any other difference in elevation between the floor and ground levels shall be overcome by means of inclines which do not exceed 1 foot rise in 10 feet. When side and rear courts are necessary they shall not be less than 5 feet wide in the clear and shall lead to a street or alley, and all doors opening into the courts shall be made to swing flush with the wall.

Exits: In all cases shall not be less than 5 feet nor more than 6 feet wide in the clear and shall be outswinging double doors, equipped with approved panic locks.

Aisles: Having seats on both sides shall not be less than 4 feet wide in the clear and wall aisles shall not be less than 3 feet, 6 inches wide in the clear. Cross aisles shall not be less than 5 feet wide in the clear.

Seats: Shall be separated by arms and shall not be less than 18 inches between

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the arms and should be 30 inches from back of rows, and shall be securely fastened to the floor. The front row of seats shall not be less than 12 feet from the screen and the rear row of seats shall not be less than 5 feet from the foyer wall.

Motion Picture Machine Booth: Must conform in every respect to Act 206, May 1, 1909.

Stage: If any, must conform to Act 233, May 3, 1909.

Plans: Showing all details and dimensions must be submitted in duplicate to this Department and approved in accordance with Section 5, Act 233, before commencing either new work or alterations.

CLASSIFICATION OF THEATERS

Theaters seating less than 251 shall conform to General Requirements and, in addition, shall have two 5 foot exits in front and two 5 foot exits in the rear.

Theaters seating less than 501 and more than 250 shall conform to General Requirements and, in addition, shall have three 5 foot exits in front and two 6 foot exits in the rear.

Theaters seating less than 1,001 and more than 500 shall conform to General Requirements and, in addition, shall have three 5 foot exits in front, plus 20 inches additional for each 100 or fraction of 100 over 500, two 6 foot exits in the rear and two 5 foot exits, placed one on each side of the theater.

Theaters seating over 1,000 shall conform to General Requirements and in addition, shall have four 5 foot exits in front and one additional 5 foot exit in front for each 500 seats over 1,000, also, two 6 foot exits in the rear and two 5 foot exits on each side, centrally located.

Goggle Lesson to a Chance-Taker

From "Safety." Bulletin of the American Museum of Safety

A DECISION by the Industrial Board of Indiana, may have the effect of reducing eye accidents due to carelessness or negligence by workers.

The plaintiff, while in the employment of the defendant company, received a personal injury resulting in the permanent reduction of sight of his right eye to below one-tenth of normal vision; his employer had provided him and all other employes working in the department in which he was engaged at the time of his injury, with suitable goggles; and as it was entirely practicable for the injured worker to wear these goggles while performing his work, if he had been wearing them his injury would not have occurred.

The defendant company not only provided proper goggles, but also instructed the foreman under whom the injured employe was working to insist upon the employes *wearing* their goggles. The foreman had made a consistent effort to enforce these instructions, and when employes were found working without their goggles they were not only reprimanded, but in some cases discharged. The injured worker had full knowledge of this practice, and was aware that several of his associates in his department had been discharged because of their refusal to wear the goggles provided.

Following the accident, the company provided this injured employe with a physician and the proper surgical and hospital services. The plaintiff neglected to carry out the instructions of the attending physician in the treatment of his injury, and it was claimed that this neglect contributed to the loss of sight.

In view of all these facts, the Industrial Accident Board ruled that the plaintiff was not entitled to an award, with the following significant comments: "The employe, as well as the employer, has his part in accident prevention. The law cannot be made effective unless its provisions are enforced against both the employer and employe without partiality. When the employer provided goggles and consistently insisted upon their use it had done all that the law required of it in this respect. Under such circumstances the failure of the employe to use the goggles constituted a willful refusal to use a safety device, which defeats an award of compensation."

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Industrial Accident Prevention

By L. A. Beagle

Special Representative, Zurich General Accident & Liability Company

Author's Note—*Statistics show that* 40,000 *lives were lost and* $600,000,000 *wasted through industrial accidents in* 1916. *We can have only a faint conception of what these figures represent in misery and loss of property. While the "Safety First" movement has reduced accidents and accomplished good results, we feel that the employer and employes are not doing all that is in their power to prevent accidents. The right-minded men in industry who have a deep conception of their duty toward their fellow men can prove a boon to humanity.*

THE law of contingency is uncertain. Conditions may arise at any moment resulting in injury or death. At times, accidents may seem beyond human control. On the other hand, unquestionably a vast number of accidents are directly traceable to purely human thoughtlessness and negligence, frequently amounting to criminal indifference toward mankind. The man whose forethought leads him to remove the source of danger is entitled to a greater recognition than he who invites disaster through lack of precautionary measures. Every accident indicates the presence of two or more elements, such as defects in materials or machines, and methods or actions in men.

If our industrial accidents are to be prevented or reduced in number, our efforts must be directed by well studied plans. After the perfection of such plans we must be persistent in carrying them out or nothing is gained toward the reduction of accidents.

The reduction of accidents depends, first of all, upon the attitude of the employer. What is the use of preaching safety to the men who are obliged to work about unsafe machinery and in unsafe factories? The employer should first put the plant in as safe a condition as possible, equipping all machines with safeguards as far as practicable. However, the responsibility of the employer does not end when he has equipped his plant with all possible mechanical safeguards.

Accidents will still happen through the carelessness of the workmen or through other defects which cannot be prevented by mechanical safeguards. Whether in installing mechanical safeguards, in conducting educational campaigns or in organizing safety committees the employer must place the stamp of authority upon safety efforts and convince the workmen that their employer is sincere in his desire to give them better protection.

The employer is not always in close personal contact with his men. In such cases, he must rely on his superintendent and foreman to keep in close touch with the employes, so as to give them the proper instruction and advice as to their safety welfare. It is the careful and efficient foreman who produces the greatest results as to accident prevention in the shop. He is constantly with the workmen, knows all the avenues of danger and the physical hazards of the work upon which his men are engaged. He is also their teacher and example. It is a fact that a foreman who is interested in safety and practices it will have fewer accidents than one who is careless. The foreman should realize that if one of his workmen is injured by a preventable accident, or if he knows that employes under his jurisdiction are indulging in practices which involve risk of injury to themselves or a fellow workman, he must be held morally responsible for any accidents which result from such practice. Particular attention should be paid to new men. In teaching a new man, it is an error to assume that he knows all the dangers of his new job. No foreman should set a man to work on a hazardous

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machine whose dangers are unknown to him, without first demonstrating to him the safe way of doing the particular work for which he is employed. This also should apply to the man who is given work to which he is not accustomed.

Many of the employes in some of our large industries, especially foundries, are foreigners and know very little about machinery in American factories. When they enter our factories, they see for the first time the kind of appliances with which we work. Such men should be given consideration and proper instruction until they are familiar with our methods.

What has been said about the responsibility of the foreman is not intended to suggest that the workmen have no responsibility in the work of accident prevention. It is a fact that many accidents do result from thoughtlessness, inattention, recklessness or some other cause which is within the control of the worker himself. Men do not always realize the hazards of their occupation and hence do not exercise the caution they should. Workmen should at all times keep their minds on the work they are doing, as often the attitude of the mind is a prolific cause of accident.

Workmen should not form the habit of taking chances. Because we have shifted a belt with a stick or crossed the railroad track in front of an onrushing locomotive without being injured is no proof that we will not get caught sooner or later. Dangerous habits should be broken up at once, if we have formed them.

Even when a workman has been told that a certain practice or habit is dangerous and another man has been injured because of a similar practice, he lacks imagination, generally speaking, and fails to picture himself in the place of the man who was injured. He may discontinue the practice for a time, but unless he is on the alert will soon drift back into his former careless habits.

It is the duty of the workman to see that any machine on which he works has the proper guard in place. The guard is solely for his protection and may save a finger, hand or arm. It is better to think of these things before we are injured or perhaps maimed for life. Many serious eye injuries could be averted if the workman would use the eye protectors that are invariably placed at his command by his employer. It is imperative that men who operate emery grinders, pneumatic chippers or any other machines where particles fly from the work, especially molten metal, use eye protectors. What is the value of a few paltry dollars in compensation for the loss of an eye in comparison with sound vision? The value of our services as workmen depends to a great extent upon our physical condition, and the services of a man who has lost the sight of one eye, with perhaps the impairment of the other, are not sought. I can not dwell too strongly on this point. Workmen should realize that in spite of the quickness of the protective muscles of the eyelid, the eyes are particularly susceptible to serious injury from flying objects whose presence would hardly be noticed if they struck other parts of the body. A large percentage of minor accidents that become serious are injuries to the eye.

I strongly condemn the indiscriminate use of goggles. I have found many instances where the employer has furnished one pair of goggles to be used by several men. Eye protectors are inexpensive, and there should be no excuse for employers not furnishing each man with a pair of goggles when the work is such that the eyes are in danger of being injured. Where more than one man is expected to use the same pair of goggles, no one assumes the responsibility for their care and they are usually left in a dirty condition. When in such condition they are unfit to be used on account of obstructing the vision. It must be expected that the use of goggles tends to obstruct the vision because of the light they shut off. It is important that workmen who do arc welding use goggles of a proper tint to shield the delicate nerves of the eye from the destructive electric rays. In many instances I have found emery grinders and other machines, where it was necessary to use goggles, located in dark sections of the factory. Such conditions should not exist, as they cause undue strain on the eyes, aside from the hazard involved.

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Unguarded machinery is responsible for only about 30 per cent of accidents in industrial plants, the remainder occur through other sources, such as thoughtlessness, inattention, carelessness, miscalculation, misjudgment and negligence. Many of the accidents attributed to carelessness are due to the momentary distraction of the mind. The proper attitude of mind must be taught before proper standards of safety can be reached.

I have found on a number of occasions in visiting industrial plants, workmen who were under the influence of liquor. When in such condition they are a great source of danger to themselves and their fellow workmen. When such things are known to the employer and he allows them to continue, he is imposing an unjust burden on the insurance company that is carrying his risk, aside from the misery that may befall such a man's family in case of accident or death.

Many accidents are caused, both directly and indirectly, as the result of depleted mental activity of the workman himself due to the excessive use of liquor. It is a well known fact that alcohol is first a stimulant and then a depressant to human beings. Railroad companies are laying great stress on this subject and are not employing men addicted to strong drink. I do not propose to dictate as to the liberties of workmen when not on duty, but we must appreciate the fact that unless our mental faculties are in the best possible condition, we are sources of unnecessary dangers to ourselves and others.

In my opinion one of the greatest sources in the elimination of accidents is in the conducting of an efficient safety organization, one in which employer, superintendent, foreman and workman are alike interested.

It is a fact, and statistics show, that where a well conducted and efficient safety organization has been maintained, the number of accidents has been materially reduced.

In conducting a safety organization, it must be such as to show that the safety work is conscientiously carried out, and the condition of the plant must indicate that such work is effective. The object of safety organization is to prevent accidents and they must be conducted to that end.

The employer should lend his aid in every possible way in conducting a safety organization; it increases the efficiency of his employes.

Many accidents, which it is quite possible could have been prevented by safety organization and education, have happened to workmen whose services are valuable to the employer, laying them up for long periods of time, thereby causing financial loss to the employer of much more than the amount the injured would receive under compensation.

A safety organization should consist of a general and workmen's committee, safety inspector, and a bulletin board. The size of these committees should depend entirely on the size of the plant and number of employes.

I will offer only a few suggestions which I think should be practical in the various branches of a safety organization to make it successful.

The general committee should consist of men in responsible positions in the plant who are to act in an advisory capacity, and who are capable of judging the practicability of proposed safeguards or practices. They should investigate all accidents and discuss them for the purpose of devising means of preventing the occurrence of similar accidents in the future. They should see that new employes are properly instructed as to the hazards of their work and see that the employes of different departments are being educated in safety practices through proper instruction and bulletin boards.

WORKMEN'S COMMITTEES

This is a very important branch of safety work. The committee should work in harmony with the employes and the workmen should feel free to offer at any time suggestions which will improve the conditions of the plant. Many conditions may exist about a plant that will possibly be overlooked by the safety inspector, such as slippery floors, poor light, exits to fire-escapes, etc. The size of the workmen's committees need not prevent other workmen from exercising

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a part of the functions of such committee. Every employe should consider himself a committee of one to prevent accidents. Many accidents are not peculiar to one department of an industry and I consider it advisable to interchange inspections. That is, committees and workmen from one department should make occasional inspections of another. One who sees the same machines and practices day after day may not notice some unsafe condition that would be noticed by a workman from another department. There should be a friendly rivalry in inter-department safety work, as all such efforts will tend to produce results, which is what all should strive for.

Frequent meetings should be held of all committees and workmen. Such meetings should be presided over by some official of the plant. The meetings should be dignified, but not too formal. Free discussion should be allowed on all recommendations of the committee or workmen as to defects or corrections to be made in the plant.

Question boxes could be made very interesting at such meetings, the questions to be answered by the director of safety or the superintendent. The all-important thought should be, how shall we create interest and enthusiasm in the safety work?

Bulletin boards should be placed in a conspicuous place so as to attract the attention of all employes, as they offer great opportunity for safety education. Where the contents of bulletin boards are read, they make a constant appeal for safety. The matter that is placed on bulletin boards must be attractive. It should not consist of detailed statistics, but of brief accident reports and other safety matters that will be of interest to the workman. The ordinary workman will not stop long enough to read long, uninteresting matter. Accounts of accidents that happen in the plant should be plainly typewritten with a note telling how a recurrence of such an accident can be avoided. I would suggest the use of pictures and photographs of injured persons, as such views leave a lasting impression on the mind. Bulletin boards should also contain printed instructions that are necessary, in the language of the men employed.

SAFETY INSPECTORS

The safety inspector should be one of the most competent mechanical men in the plant. He should make weekly, or more frequent, inspections, depending on the size of the plant and number of workmen, making out reports on blanks furnished for such work. He should submit to the general committee any recommendations for changes or repairs which will tend to prevent accidents. The work of this inspector is most important, as the general physical conditions of the plant depend to a great extent on the thoroughness of his work.

SOME COMMON CAUSES OF ACCIDENTS

Obvious hazards are soon detected and steps are usually taken to remedy them. It is the so-called trivial causes that are most neglected which often result in serious accidents.

A large number of accidents occur through the use of hand tools, both to the user and others who work within the range of flying objects from such tools, such as hammers and chisels with mushroomed heads, or hammers flying from handles. Great care should be taken to see that hand tools are free from defects and are kept in the best possible condition at all times.

Great care should be exercised in the use of ladders. Often ladders are so placed that great stress is put upon them, especially extension ladders which are loosely put together, permitting them to sway. Metal points should be placed on the feet of ladders used on slippery wooden floors, and suction or non-slip safety feet on floors made of other hard slippery material. It is important to see that the top of a ladder is in a safe position before being used, as its safety does not always depend on the bottom.

Platforms and scaffolds when improperly constructed and built of defective material are a great source of danger. Oftentimes men who are put on the erection of such work are careless, and do not give this important matter sufficient thought to make conditions safe.

Cleaning machinery while in motion

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is a common cause of accident. It does not matter how well a machine is guarded accidents will happen to the careless operator who persists in cleaning the machine while in motion. It is especially the piece worker who tries to save time by such practice, and drastic measures should be taken by the employer to prohibit such conditions. Great care should be taken to see that all machinery undergoing repairs or changes is so tagged, that it may not be started by some other person than the repairer. This will also apply to electric linemen. Switches that cut current out of lines being repaired should be tagged, "Man Working on Line." Many fatal accidents have happened to linemen through the carelessness of other persons throwing on a switch not properly marked.

The wearing of flowing neckties, loose overalls, and torn or loose sleeves should be avoided. If gloves are to be worn at all, the fingers should be cut off at second knuckle. Even with such precaution there is great danger in wearing gloves around machinery. Women working around machinery should wear caps to prevent their hair from catching in the revolving parts.

Railroad hazards around factories are usually overlooked. There is great danger where a siding is close to a building, leaving only a small clearance between car and building. Often such space is used as a path when there are no cars standing on siding. Should a car be kicked in on such track, unobserved by a person walking on the track, it would result in a serious, if not fatal, accident. Doors to factory buildings often open at right angles to a track where it is necessary for workmen to cross from one building to another. Such conditions are hazardous and proper warning signs should be posted at such places.

Chains, ropes and hooks either on cranes or in other use should receive frequent inspection and workmen who use them should be familiar with the safe loads that they may be put to under various conditions. The position of some ropes and chains is such that it is not always convenient to inspect them, and on this account proper inspection is sometimes neglected until a serious accident has happened.

Great care should be taken when it is necessary to use pulley block and rope in connection with turntables to place cars in a plant, as pulling the car at right angle to factory track with rope is hazardous, especially if pulley block fails. Men should always keep at a safe distance from the whip of the rope when on such work.

Many serious and fatal accidents have been caused by fooling or "horse-play" in plants. The employe who indulges in such practices is thoughtless and does not realize the danger to himself or others. Such practices interfere with the work of the plant aside from the many fingers, arms and lives which they have cost. This kind of thing should not be tolerated in any plant, and it is the duty of the foreman to use drastic measures to prevent it. Much more could be said on this subject, but time and space will not permit.

The foregoing remarks are intended to broaden the interests of industrial safety by showing that accidents can be prevented, and suggesting some means of accomplishing the object. If both employer and workman will keep in mind the suggestions as offered and practice them, many accidents can be prevented.

It makes little difference how we obtain results in accident prevention. What vitally concerns us all is the actual securing of such results, and it seems to me that safety education, after all, is the dominant factor in reducing the toll of human life and limb.

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Electrical Accidents Underground

THE Bureau of Mines, Department of the Interior, has just published Technical Paper 138, "Suggested Safety Rules for Installing and Using Electrical Equipment in Bituminous Coal Mines," by H. H. Clark and C. M. Means.

Mr. Clark, in discussing the paper, says: "The code is unique in some respects. The first step in its development was to establish five basic measures that would insure the use of electricity with safety and to use these as a basis upon which to formulate the rules. Each rule is proposed as necessary or helpful to the accomplishment of one or more of these measures.

"Definitions have been established for an unusually large number of terms.

"Some of the defined terms are the following:

"Approved: The use of this term makes it unnecessary to include in the rules detailed specifications which will give rise to complaint, misunderstanding, and endless debate unless given constant consideration and very frequent revision. The use of the term makes it possible to take immediate advantage of any meritorious equipment, methods, or practices that may be developed subsequent to the publication of the code. The indefiniteness that has been associated with this term and has discouraged its use is removed entirely by the definition which designates the approving authority clearly without restricting it.

"Switchboard—Underground Station —Portable Motors: These terms have never been defined in connection with mine electrical codes and a definition has been needed to dispel the uncertainty that existed as to their exact meaning.

"Gaseous Place: This is probably the most unique and valuable definition that is offered. Of all the much debated questions relative to coal mines, probably none has received more consideration and has been less satisfactorily answered than the question, 'What constitutes a gaseous mine?' The authors found that it was indispensable to the success of the rules to have a term that should designate a place in a mine where, on account of the presence of gas or the potential presence of gas, it was unsafe to operate electrical apparatus at all, or unsafe to operate unless it was especially constructed and safeguarded. After careful consideration the term 'gaseous place' was selected to designate such a point in a mine. This term does not attempt to define a gaseous mine, a gaseous part of a mine or a gaseous district in a mine, but merely a place in a mine that, on account of the presence or possible presence of gas, is an unsafe place to operate electrical apparatus.

"It will, of course, be admitted by everyone that if a place is likely to be dangerous from the presence of inflammable gas, electrical apparatus either should not be used there at all or, if used, should be suitably safeguarded.

"There are a number of desirable requirements in these rules that either have not appeared at all in other rules or have not been emphasized there. Among these requirements is a table for the carrying capacity of bare copper conductors. While tables of this sort have been compiled in the past, the current carrying capacity assigned to the same wires has differed as much as 45 per cent, and the basis of reference was not in terms that were altogether applicable to the requirements of the rules. The bureau, therefore, undertook to establish the carrying capacity of bare copper wires in terms of the amount of current that such wires would carry without charring dry wood, burlap, and canvas brattice cloth pressed firmly upon the wire from a point about it. Tests were conducted to determine the amount of current that would produce positive charring for each wire examined. The current was then reduced until the charring was almost imperceptible and then, to introduce a factor of safety, 90 per cent of this latter current was established as the safe carrying capacity of the bare conductor.

"Stress has everywhere been laid on good construction and installation, as it is believed that this alone will help a great deal to bring about safe conditions."

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Committee on Health and Safety

National Association of Manufacturers

A COMMITTEE of the National Association of Manufacturers, hitherto known as the Committee on Workmen's Compensation and Accident Prevention, is now called the Committee on Health and Safety.

The directors of the manufacturers' association approved recently a suggested plan of organization and operation which the committee itself submitted as a prelude to a greater activity and usefulness. The committee that asked for the changes was composed of Carl M. Hansen (chairman), R. G. Williams, H. E. Miles, George N. Van Derhoef, W. E. Williams, Otto P. Geier, F. F. Beall, and James A. Emery and A. Parker Nevin, counsel.

The recommendations submitted by the committee, approved by the directors and now in full force and effect, were in substance as follows:

That the name of the committee be changed to read "Committee on Health and Safety," for the reason that the word "accident" appearing therein automatically limits the scope of effort to accident prevention solely. Occupational disease prevention is as essential and fire prevention is as necessary to manufacturers, from an economic and humane standpoint, as is accident prevention.

That the personnel of the committee be greatly enlarged, in fact, that no limit be set on the number who may serve on the committee. It would seem desirable that every State in the Union be properly represented, preferably through the State association of manufacturers or if no such body exists in the State, then through individual representation, through a manufacturer in that State, member of the National Association of Manufacturers. To obtain the greatest usefulness to the national body and the country as a whole, and in the interest of the co-operation, so highly necessary in questions of this nature, which affects equally the State associations and the national association, an enlargement of the committee seems desirable and, in fact, essential.

That the committee be divided into two separate sub-committees, one to deal with insurance questions, the other with preventive measures. The two problems, being closely interrelated, the two committees could meet, say, once or twice annually, for joint consideration of the problems confronting them.

SUB-COMMITTEE ON INSURANCE

The portion of the committee to deal with insurance matters should be composed largely of men in manufacturing establishments who have charge of the placing of insurance and of men representing manufacturers' insurance companies and mutual associations. In many of our large manufacturing plants, a separate department is maintained for that purpose with very able men in charge. Their services in this connection would be invaluable. It should be the duty of this committee to obtain and collate statistically matter bearing on the different forms of insurance, such as workmen's compensation and health insurance, to obtain the actual facts in relation to these forms of insurance, especially representing economic burdens they will impose and the proper methods that should be adopted to distribute that burden; not as these facts are usually presented in our legislative halls by so-called social reformers, or as often published by insurance underwriting bodies, but the facts as they actually are, without any frills in the nature of inferences, opinions or hasty conclusions. A competent statistician could be engaged advantageously for the collation of these facts in such a manner that when necessary the data would be available for publication in the different States and for presentation before legislative committees in States where legislation on any of these subjects affecting the manufacturing body of this country economically is proposed. It should further be the duty of this part of the committee to carefully investigate what form of insurance in final analysis will prove the most desirable

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for the manufacturers and their employes. We have so far attempted to emulate in a large degree the various European systems, none of which appears to fully solve our problems. An American system can undoubtedly be evolved from these different systems, taking those things out of each which are good, eliminating the undesirable features and welding the whole together in a system which will be truly suited to and in harmony with our institutions, a system which will as little as possible interfere with the relations between employer and employe, a system built on individual initiative which is fundamental to America, a system which will have none of the paternalistic aspects so prevalent in Europe. Who are more competent to evolve such a system than the manufacturers; and a committee composed of men representing these manufacturers undoubtedly can evolve a constructive program along these lines, a plan which will be shorn of isms and which, when presented to the country, will receive the considerations to which it will be justly entitled, but it must be predicated on facts, not opinions. Careful consideration must be given all phases before final adoption, and statistics must be available with which to prove every contention made.

SUB-COMMITTEE ON SAFETY

The other part of the committee, which, it is suggested, shall deal with preventive measures, should equally attempt to predicate its conclusions on facts only. This country has, for the last few years, had a deluge of activities along preventive lines, particularly in relation to accident prevention. Most of these efforts have been good and undoubtedly have produced beneficial results. Still, viewing it unbiasedly, there is to-day largely a Babel with little or no cohesion. Manufacturers, as the ones primarily affected, should take a national lead in this movement by taking the subject out of the realm of emotion, where it is at present, and putting it on a true economic basis, where it ought to be. The manufacturers are primarily interested. They are called upon to comply with the standards or so-called standards of various legal authorities and other self-constituted authorities, with the result that many of them do not know where they "get off." If they comply with the recommendations of their insurance carriers, they often find they are in violation of some medieval statute discovered on the law books in some States; *vice versa*, if they comply with the State requirements, they often find they are in violation of the underwriter's exactions.

The whole matter is largely a question of fact. A certain condition, speaking physically, is either safe or not safe. It is either fireproof or combustible. The men who are out in the field, who daily have the problems to deal with in the different industries, are the ones most able to determine whether a thing is, at the same time, safe and practical, or impractical. Practical men from the different manufacturing establishments throughout the country, exchanging views, will, in the course of time, be able to codify the efforts exerted through all other channels in such a manner that they will be available and found practical in application. The idea is not to hamper or destroy the efforts exercised through other bodies. They should all be encouraged. But none of them should be vested with power or authority to say to the manufacturer that such and such a plan is the proper procedure, such and such an appliance is the only one that you can use, unless the method and appliance proposed have gone through the crucial test of practical application.

To properly carry on the work of this committee, investigation and research are necessary. It is suggested that the committee be authorized to engage for the present, not more than one engineer at a salary not to exceed $175 per month, this engineer to work under the direction of the committee, to devote his entire time to investigation of hazards, preferably one or two industries at a time; to establish the causes of accidents, investigate all known or proposed methods of eliminating these causes either by inherent changes in the construction of the machine producing the accidents or by preventive appliances affixed to the machine; and then a most minute investigation should be made as to its practicability before final conclusions are sub-

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mitted to the committee for endorsement and approval.

Equal investigation appears essential in the matter of occupational diseases. In many industries where occupational diseases have been prevalent in the past, it has been found by scientific and careful research that most of the causes of the occupational diseases could be eliminated by the introduction of inexpensive but very effective improved methods of manufacture. It is your committee's belief that the National Association of Manufacturers can be of signal service, not alone to its own members but to the country as a whole, by attempting to shed further light on this subject.

Such publicity matter as in the judgment of the officers and board of directors would seem essential in order to counteract efforts antagonistic to the association's program on workmen's compensation and health insurance in general can be handled more effectively by a small committee of say not more than three, in conjunction with the editor of *American Industries.*

APPROVAL OF SAFETY APPLIANCES

National approval of accident prevention appliances and, for that matter, fire prevention appliances, also, is to-day largely centered in the Underwriters' Laboratories of Chicago, an institution maintained by the fire and casualty underwriters. Nominally the Federal Government has a representative from the Bureau of Standards on the council of that committee, but as a practical proposition it is operated by the underwriters solely. The chairman of your committee had the honor and pleasure of being personally responsible for the starting of the casualty department in these laboratories, and has for the past two and one-half years been the consulting engineer to these laboratories. He has always advocated, and this committee now advocates, that the manufacturers should be represented on the council of experts these laboratories maintain. The manufacturer is the one who is asked to comply with the requirements imposed by the laboratories. He is the one who is requested to use the appliances approved without any voice in their approval. He is the one paying all expenses incident to testing and approval. It is in the true sense of the word, "taxation without representation," and should not be countenanced. Your committee believes that if the matter is taken up and presented to the Underwriters' Laboratories that they will see the advantage of having associated in their counsel experts representing the manufacturers, that they will have less trouble in having their requirements complied with if the manufacturer has a voice in the determination of these requirements and is assured of their practicability before approved. Your committee asks approval on negotiations to that end being instituted.

The board may consider this a rather ambitious program. Your committee feels, however, that nothing within the realm of practicability is too ambitious for an association of the magnitude and importance of the National Association of Manufacturers and the practicability of the suggestion made, we believe, is beyond question. The association numbers within its ranks most of the leading manufacturers of this country. Those not now members of the national association can be reached by the plan of State representatives on the committee so proposed; and it may and undoubtedly will result in greatly strengthening the association. It is patent that nothing will hold any body of men together more firmly than something in which they are mutually, economically interested. No matter what competitive situation exists between manufacturers in matters like accident prevention and the various forms of workmen's compensation and health insurance, their interests are identical. The industry must bear the economic burden imposed whether the plant is in California, Maine or Florida, and employers are all interested in keeping that burden to a minimum within justice.

We believe the plan presented is a constructive one, that if worked out on these lines it will place the National Association of Manufacturers in the foremost front in this entire movement and there is where the association belongs. The National Association of Manufacturers was the first to recognize, see the justice of and take up the question of workmen's

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compensation aggressively in this country, but, somehow, other interests far less qualified to deal with and far less interested in the problems, seem to have taken control. The action of the association should, in the opinion of your committee, now be even more aggressive and by having actual facts to place before the public, it can be made so and a hearing can always be demanded.

Stand on a Higher Platform in Safety Work

By H. L. Brownell

Public Safety Engineer

THIS article is not intended for a "knock"—it is a "boost." Read it in that spirit. The author realizes that he is speaking to the large manufacturers and the safety experts of the country, as they are the ones who read SAFETY ENGINEERING, not the general public.

I read with much regret in the report of the fifth annual congress of the National Safety Council, the greatest safety convention which has so far been held, statements of the financial end of this work, emphasis on the saving of money, not on the saving of human life, which is the most valuable thing in the world.

The call at this time is for more unselfish work on the part of the safety workers. The financial gain is bound to follow when the co-operation of all interests is secured—and not before.

Let us show the industrial worker that we have an interest in his welfare outside of the shop, outside of his regular work, an interest in his home life, in his wife and his children. That will win response from the employe.

We must be consistent in our work if we are preaching "Safety First," which means also that "we are our brother's keeper." Then let us practice as we preach. Emphasize in all your work with your men that the safety idea is for the benefit of themselves and their families. Never confine your work to the safety of the plant; show the workers that the company is interested in them at all times. Nothing will bring co-operation from a man more quickly than to really do something for his child.

To illustrate: I started safety work for a traction company in a large city. The company was, possibly, the most unpopular one in the country at that time. I devoted more than half of my effort to safety outside of traction interests. One critic said: "That's a good stunt but it doesn't get the street car company anything—wonder why they have him do it." Then the critic added, more thoughtfully: "He is all right. I guess the company that employs him to do that isn't so bad after all!"

The very reason why the wonderful record was made, stopping more than 80 per cent of the accidents to children in that city, was that it was unselfish safety work. We secured the co-operation of everyone.

Why was the public safety section so small at the last congress? Because the workers have not yet awakened to the responsibilities and opportunities in that line.

An "international traffic expert," speaking before the public safety section, complimented the city of Detroit on the efficient way that traffic was "carried on" in the city. All who are familiar with the accident records of Detroit know that no other city in the country is such a "slaughter pen" as Detroit! Why? Because the pedestrian is given no consideration whatever. It is a question of moving vehicles, even though the pedestrian be moved to another world.

The keynote of the entire question is *safety education,* but it must be consistent. The State and city authorities must be educated first. Every person who operates an automobile should first pass a physical and mental examination and then be licensed to drive. The "expert"

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said: "I do not think it is necessary for everybody to have a license." But absolutely *everybody* should be examined, and no one under 18 years of age should be licensed, or permitted to operate a motor vehicle.

For example: I visited one of the public schools of Chicago for the second time within a year with my pictures on safety, because that school had a group of deaf and dumb children. The second day after my second visit, a boy about 15 years old, driving an automobile at a high rate of speed past the school, ran over and instantly killed one of the deaf and dumb children. A 15-year old high school boy, living in the vicinity of my home in Chicago, has a car of his own, and was recently driving a heavy limousine car past a school building at a speed of 40 to 45 miles an hour. He was "showing off" the speed of the car to a girl who was with him. I have also seen lately in the Edgewater district, Chicago, a 4-wheel motor wagon, a home-made device, run by a 10-year old boy at a high rate of speed past a school and its playgrounds, through crowds of children, at the close of a session. We know all these things. Yet we preach safety and permit them to continue.

Fifty per cent of the accidents which occur in one of the largest cities of the United States can be traced to the effects of "booze."

We can not secure the co-operation of pedestrians in safety measures unless we first "clean house." Give the pedestrians a chance at the crossings and, perhaps, they will not cross the streets in the middle of the block as they do now.

The president of the National Safety Council said in the public safety sectional meeting: "The police seem to have a sense of keeping the vehicular traffic moving, but they do not seem to think so much about the pedestrian." That is the keynote of it all. The pedestrian is not given sufficient consideration by the police in any city; therefore, he is against any ordinance that further curtails his liberty, as he sees it. When it becomes a "fifty-fifty" proposition, we shall have the pedestrian with us in all safety measures.

Down with selfish safety work, booze, etc! Up with the unselfish safety work and measures! Then we shall have a very different story from that of the year 1916, whose records for the first 8 months show that in New York City 226 persons were killed by automobiles alone; in Chicago, 205; Philadelphia, 88; Detroit, 63; Los Angeles, 57, and Columbus, Ohio, 40. You safety workers in these and other places—WHY? Because you are not doing all that you can do and should do.

In the city of Chicago, murders increased from 77 in 1915 to 101 during 1916. Yet they did not keep pace with the automobile killings which, during 1916, amounted to 276. Just think of the figures! Nearly three times as many persons killed by motor cars as were murdered. Let us change these records.

Anthrax as an Occupational Disease

United States Department of Labor

ANTHRAX is primarily a disease of animals, such as cattle and sheep, but is transmitted to men in a number of industrial pursuits, including among its victims hide and skin handlers and other tannery employes, longshoremen, wool-sorters, hair workers, brush makers, farmers, ranchmen and veterinarians. The relative importance of this disease is indicated by the fact that for every five deaths from lead poisoning in the United States registration area, there is one death from anthrax. A study of anthrax, as related to various occupations, has been published by the Bureau of Labor Statistics of the United States Department of Labor, in its Bulletin No. 205.

According to the bulletin, public atten-

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tion has been drawn recently to human anthrax by the startling increase in the number of cases in seaports and tannery towns in New York, Massachusetts and Pennsylvania. Among European countries, Russia and Italy are reported to be the most seriously affected by both animal and human anthrax.

In man, contagion commonly occurs among persons handling animal materials through an abrasion of the skin, resulting in the so-called "malignant pustule," or "malignant edema." Cases have been caused by bites of insects and of pet animals, which have fed on diseased materials, and even by spores found in shaving brushes. Wool sorters' disease or pulmonary anthrax is a less frequent, but almost invariably, fatal form of the malady, caused by the inhalation of dust or particles of hair or wool from diseased animals.

SPORES LIVE AS LONG AS SEVENTEEN YEARS

The anthrax bacillus is one of the largest and most easily recognized of the disease-producing organisms; it is not, however, to be so much feared as a cause of disease as the spore, which is able to survive for as long as 17 years without nutriment. This spore is easily carried about, and under favorable conditions, rapidly germinates and sets up a focus of infection.

COMMON FORM OF ANTHRAX

Inoculation resulting in the malignant pustule is the most common form of anthrax. This begins with a red pimple, about the size of a pin's head, which at first causes little pain. The pimple rapidly increases in size and becomes surrounded by a peculiar resilient swelling. In the center of the pustule is a black spot, around which the skin rises in blisters. On the third or fourth day the lymphatic glands in the vicinity of the pustule are usually swollen and painful. The complete cycle of the disease occupies on the average 9 or 10 days. The necessity of prompt diagnosis and treatment for the affected part is emphasized by leading authorities.

MALIGNANT EDEMA

In malignant edema, the other form of external anthrax, the pustule is absent. The swelling usually covers an extensive surface and is most frequently situated on the eyelid, neck, or forearm. In severe cases there is redness, vesication, and a gangrenous appearance of the skin. This form is much less frequent than the pustule.

Internal varieties of anthrax, including pulmonary anthrax or wool sorters disease, are comparatively rare, but are usually fatal.

The bulletin traces the history of anthrax in the United States from the first record of human cases, in Philadelphia, in 1834, down to the present day, showing its rapid increase in comparatively recent years. From hospital records, the most valuable data available, it is estimated that about one in every five cases is fatal.

PREVENTION OF ANTHRAX

In the field of prevention this country has lagged far behind European countries, although 24 States now require the reporting of cases of anthrax. Two States authorize workmen's compensation for anthrax arising in the course of employment, and in a few of the States compensation payments have been made for anthrax contracted as the result of a definite injury received while at work. The prevention of anthrax among industrial workers has received very little attention. There has been a tendency to relax the precautions governing the importation of animal materials, so that, as far as human anthrax is concerned, the situation appears to be growing worse instead of better, and energetic action will be needed if this occupational disease is to be stamped out.

The awarding of compensation to victims of occupational anthrax has made very little progress in this country, Massachusetts being the only State that is consistently following this principle.

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Accidents Reduced by Kodak Company

From a Report to the Rochester Chamber of Commerce

A REDUCTION of nearly 67 per cent in the number of accidents for each 1,000 employes in 1916 under that of 1912, is shown by the Eastman Kodak Company on the accident prevention blank which the company filled out at the request of the statistical committee of the safety council of the Rochester Chamber of Commerce. The total number of accidents among the 5,578 employes in 1912 is recorded as 341, or 61.13 accidents per 1,000 employes; as compared with a total number of 147 accidents among the 7,186 employes in 1916, or 20.46 accidents per 1,000 employes.

The total number of accidents for each 1,000 employes is considered the best basis for comparisons. Comparisons between yearly totals of accidents are misleading because they are affected materially by variations in the number of employes. For instance, the yearly total of the Eastman company in 1916 shows an increase of 14 accidents, or 10 per cent over that of 1915. Yet in view of the fact that the number of employes in the two years jumped 1,092, or nearly 18 per cent, the accident increase virtually was not an increase, because accident totals depend largely upon employment totals.

It is to be expected that the total number of accidents among employes in a large factory force would be greater than that of a smaller force, because there would be more people subject to the accident risks. That, of course, presupposes that the accident hazards are proportionately equal in each plant.

The increase shown in the blank of nearly 30 per cent in the number of employes in 1912 over that of 1916 is significant.

The foregoing blank does not contain figures under some of its columns for 1912-13-14 because those figures were reported to, and used by, the Rochester chamber's safety council some months ago. Those columns containing figures for 1912, 1913 and 1914 have just been added to the council's records and all concerns have been asked to fill them out whether or not the council has their figures under the other columns for the years in question.

Summary of Accidents of Eastman Kodak Company

	ANALYSIS AS TO CAUSE OF ACCIDENTS							ANALYSIS OF PERIOD OF DISABILITY							
YEAR	No. of accidents on machinery equipped with guards	No. of accidents on machinery equipped with guards not used at time of accident	Total number of machine accidents	No. of other accidents due to carelessness	No. of unclassified accidents	Total No. of all accidents	No. of accidents per 1000 employes	No. of accidents involving a loss of time, but not exceeding one week	Over one week but not exceeding two weeks	Over two weeks but not exceeding four weeks	No. of accidents over four weeks' duration	Total No. of all accidents	No. of accidents resulting in permanent partial disability	No. of accidents resulting in permanent total disability	No. of fatal accidents	Average No. of persons employed during the year
1912	....	....	99	....	....	341	61.13	....	....	....	....	....	....	....	....	5578
1913	....	....	91	....	....	338	55.17	....	....	....	....	....	....	....	....	6126
1914	....	....	51	....	....	158	27.41	....	....	....	....	....	....	....	....	5765
1915	41	1	42	12	79	133	21.83	76	20	13	24	133	5	....	....	6094
1916	55	2	57	13	77	147	20.46	65	23	36	23	147	17	....	....	7186

(The State's definition of an accident is one which causes any loss of time other than the balance of the day, turn or shift on which the accident occurred or which requires any medical attendance other than the first aid treatment.)

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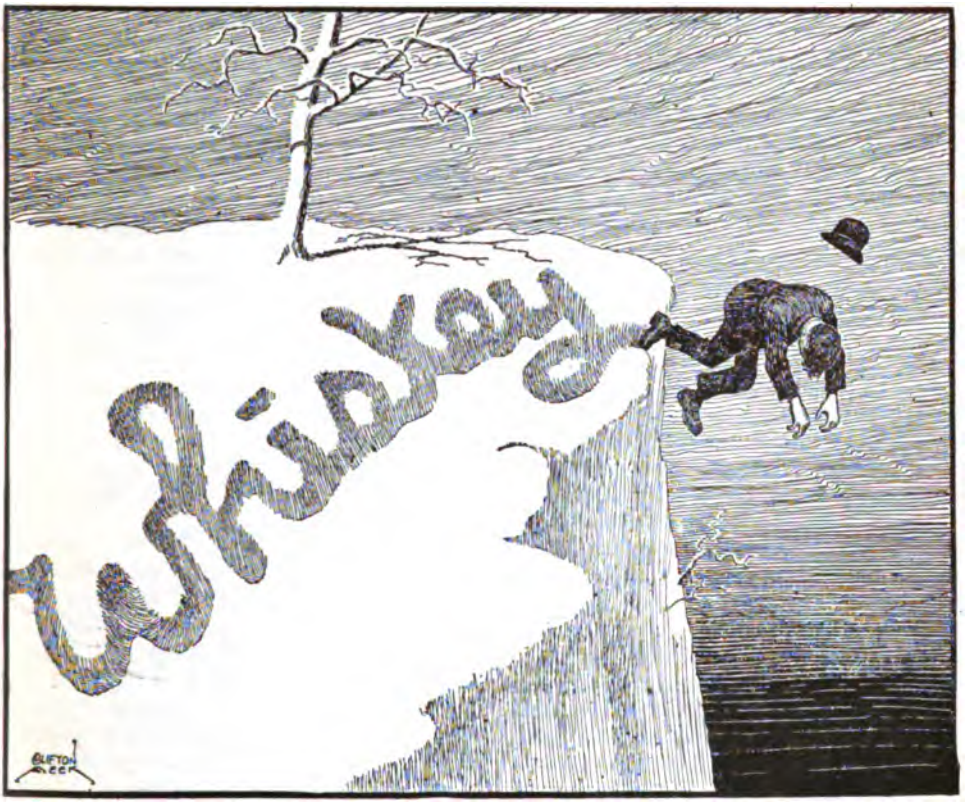
The End of the Road

New York Evening Journal, March 14



Follow it to the end and the whiskey road ends always in the same way.

A crooked road, a hard, sad road that ends in misery and destruction.

Whiskey has ended and destroyed many a man, his hopes, ambitions and his family.

Whiskey's combined power has ruined millions.

Whiskey kills its victims and dishonors them. It also dishonors the nation that tolerates it.

The first thing to do is to do that which is POSSIBLE. It IS possible to destroy whiskey, to forbid its manufacture and sale, except as a poisonous drug, labeled, sold, taxed and dispensed as such.

And that is exactly what the United States will do—AND DO SHORTLY.

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 268 ALL INDUSTRIES—PLACING THE MAN IN THE RIGHT PLACE.—The larger percentage of accidents in any organization is almost invariably found to occur among new employes. This is evident from the fact that many of the new men employed come from organizations where the safety movement has not been firmly adopted, or where safety organization is not accepted as an absolute necessity.

New employes hired to do certain kinds of work may not be found qualified to do the particular class of work assigned them; therefore a certain self-consciousness on the part of the individual is developed which has a tendency to influence him in over-anxiety about making good with a neglect of care for his own safety. On the other hand, a new employe may be perfectly capable of doing mechanically the class of work assigned, but will be negligent of forethought for his own safety due to the lack of training along safety lines in previous employment.

Accident prevention among these classes of men can best be influenced by individual instruction along the safety lines outlined by the employer before starting a man to work, and a very careful observation of the man's manner of doing work by the foreman in charge. A competent foreman can very readily determine whether a man is fitted for a particular class of work and place him accordingly.

Individual instruction along the safety rules outlined by the employer should be coupled with a reception in a brotherly spirit from the foreman and fellow workers, making the new man feel as if he were among friends who are willing to help him rather than antagonize him.

Accidents due to men new and untrained in the safety movement can best be avoided by developing a permanent organization where possible, in a sense that the men are advanced in their respective classes of work under the influence of a specific set of safety rules and instructions. An organization of this class of men naturally develops the trait of self-confidence, and when made to feel satisfied, they are the greatest factors in the prevention of accidents.

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No. 269 VARIOUS INDUSTRIES — SUDDEN STARTING OF MOTORS.—I feel that the only adequate protection is by providing the controlling mechanism with locking devices; furnishing padlocks to employes, requiring them to lock the operating mechanism in a safe position before exposing themselves to any danger due to the sudden starting of machinery.

Quite a number of concerns that originally required only the placing of a "DANGER—DO NOT MOVE" sign at the starting point on the controllers, have since discarded the signs, and substituted locks and hasps therefor.

I feel that the employer cannot afford to install mechanical devices of merit, the installation of which will make safe operations automatic and absolute, rather than requiring that the same degree of safety be supplied by educational methods to control the variable human factor.

The matter of equipping controlling devices to accommodate an ordinary padlock, presents a number of very simple solutions. The ordinary hasp attached to levers or a ring and chain attached to a fixed quadrant, (or a valve bonnet), are usually capable of being

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installed by the ordinary shop handy man. After the locks and locking devices have been provided, there must still be an unceasing campaign to insure their use. Every workman, whose adequate protection requires that he lock the controlling parts of the machines on which he is working, should be subject to a surprise inspection which will insure his observance of the rule.

Most plants requiring the use of padlocks in this manner have furnished them gratis to employes. Locks are of a standard construction with individual keys and a master key controlling the whole series of locks, the master key being in the possession of the head of the safety organization for use in emergency.

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No. 270 VARIOUS INDUSTRIES — SUDDEN STARTING OF MOTORS.—In my opinion, the best method for preventing the starting of motors when men are working on line shafts—making changes or repairs to machinery, also on electric lines, is to have the switch lever so arranged that it can be locked when thrown off, and the person who has thrown off the switch and locked the same should take the key. The lock on the switch should be tagged with the man's name or number who is working on the line. Then if such person fails to unlock the switch and put the same in working order when through with work on the line, which might cause a delay in the operation of the plant through his negligence, he would be known to the employer or superintendent who could take him to task for such negligence. There should be no excuse for a workman who has locked a switch for not unlocking same after performing his work, as he has the key and his plain duty should prompt him in the matter. I find that the above practice is in vogue in many large manufacturing plants.

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No. 271 VARIOUS INDUSTRIES — SUDDEN STARTING OF MOTORS.—SAFETY ENGINEERING asks for an answer to a question as to the best means for protecting men working about machinery, so that they may not be injured through the act of someone starting this machinery.

The difficulty mentioned would naturally be incurred in some cases, but it would seem that a foreman of a department would be quite anxious to know when machinery was ready to be put into service, and if such was the case he would be in close contact with the situation during the time repairs were being made.

There are some departments, or machinery, where negligence in not removing a sign would cause considerable delay, but such conditions would arise in the operation of certain machinery which would be located in some remote part of the plant and not under the direct attention of the foreman.

One of the systems which I believe would be very valuable in taking care of the difficulty mentioned, was brought to my attention in a large plant which I visited a few days ago, where they use a variety of machines, some of which are of considerable length and size. They use a system which has two buttons, located by the machinery, which control the starting and stopping of the motor. In addition to the two buttons there is what is known as a release button and it operates as follows: When the machinery is stopped it cannot be started without pressing this release button and when this is done it rings a large gong, located near the machinery, so that anyone working on same will have notice and sufficient time to get out of a dangerous position. This firm also uses the Danger Card but has the greatest confidence in the release button described above.

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No. 272 VARIOUS INDUSTRIES — GUARDING AGAINST ACCIDENT THROUGH SUDDEN STARTING OF SHAFTING.—Accidents to employes caused by the sudden starting of line shafting, etc., cannot be prevented through any full automatic arrangement—the human element must, to a certain degree, be depended upon. This means that in addition to the full application of safety devices we must depend

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to a considerable extent on safety rules, but such rules *must* be enforced before a high degree of safety can be obtained.

Regardless of what form of prime mover is employed the first thing to do is to properly, and effectively, safeguard the shafting, belts, pulleys, clutches, gears, rope drives, eliminate all protruding set screws or projections in couplings, etc. This reduces to a minimum the possibility of accidental contact, but leaves remaining the liability of a workman being caught while cleaning, oiling, adjusting or repairing some part of the machinery when it is suddenly started by some other person.

If the shafting is motor driven, the switch should be provided with two locks, the keys for same not being interchangeable. In addition to the locks there should be a signal (a gong or whistle) placed in the same room, or near the shafting, with the operating button, or card, near the starting switch. The signal should sound loud enough to be heard by the operator so he may know that it is working.

If the line shafting is driven from another line by means of a clutch, or some other device, the locking arrangement should be applied to the shifting apparatus, also the signaling device should be employed.

If the plant is steam or water power, there should be but one man with authority to start the machinery; the signal being that of a whistle, or a large gong, or gongs in separate parts of the plant if necessary. The signal must be heard in all parts of the plant.

After the precautions, stated above, have been taken, rules (with penalty attached) should be made, posted and enforced. They may be similar to the following:

RULES FOR MOTOR DRIVE

1. No employe is permitted to work on or in close proximity to shafting while it is in motion.

2. Before working on idle shafting, or on machinery connected to same, the workman must first lock the switch (or starting device) open, and keep the key in his pocket.

3. A workman must place his own lock even though some other workman has placed one on the starting apparatus.

4. In case of several employes working on or about the machinery at the same time, the foreman of each crew must answer for the other workmen in his gang.

5. Only after the removal of the lock and the last workman finished can the machinery be started, but not then until after proper signal (see Rule 6) is given.

6. Before starting give signal lasting 10 seconds—

Wait 30 seconds.
Give short signal.
Wait 5 seconds.

Start up if no request is received to wait.

The waiting time, given in Rule 6, should be changed in accordance with the distance from the starting apparatus to the shafting, so that should a workman be desirous of more time to finish some adjustment, or in the event the machinery should not be moved for some reason or other, he would have time to notify the starter.

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No. 273 VARIOUS INDUSTRIES — SUDDEN STARTING OF MOTORS.—I have given this subject much thought, and after consulting with others, all recognized authorities on such matters, I have come to the conclusion that the best way to protect workmen from accidents by the sudden starting of motors while they are engaged in making repairs on line, counter or jack shafts, belts, pulleys, or any other power transmission, operated by a motor, is to remove the main line fuses to the motor and replace one with a dummy or blank fuse, provided for the purpose, to which should be attached a sign explaining that repairs are being made on transmission and motor cannot be started until work is completed.

When the main line fuses are removed, they should be taken away by the foreman, or one of the workmen engaged in making the repair.

The writer has found from experience, that warning signs hung on the motor starter or locks provided for

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switches prove unsatisfactory, and cannot be relied upon, for many times the sign will be ignored or the lock or key be misplaced. In regard to any delay that may be caused by either warning signs, locks, or by removal of fuses, it seems to me that this is a detail that should be taken care of by the superintendent or foreman, and as the delay, if there should be any, has nothing to do with the hazard, I do not think it should be considered in connection with any safety device provided. It should be left to those who are responsible for discipline in the plant, to overcome any delay caused by such carelessness.

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No. 274 VARIOUS INDUSTRIES — SUDDEN STARTING OF MOTORS.— I believe the best method for guarding against accidents, due to the sudden starting of motors, is to provide locks for the switches or starting boxes. A number of safety switches are now on the market, equipped by the builder with means for applying a lock to guard against accidents of the kind in question.

I notice that the person making this inquiry says he has had trouble on account of persons placing signs on the starting box and forgetting to remove them. Any inconvenience from this source can be eliminated, or at least greatly minimized, by placing on each lock a tag giving the name of the person using it. He can thus be located and held responsible for any oversight in neglecting to remove the lock, and where he understands that disciplinary measures will be used there is not much likelihood of his not using the lock properly.

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No. 275 VARIOUS INDUSTRIES.—SUDDEN STARTING OF MOTORS.— We feel that the safest and probably the most effective method for preventing the starting of a motor while men are working on machinery driven by this motor, is to station one of the repair gang at the starter. He should have orders not to allow any one to touch the starter until notice has been given by him or the repair gang foreman that everything is clear. This will also insure that when repairing has been done there is no delay caused which would be incurred by forgetting to unlock a lock switch. The man used for this purpose need not be an expensive mechanic, but could be one of the helpers, and, as he is preventing accident through the premature starting of machinery, he surely is earning his wages while stationed there. It might also be possible to pick a good safety man from one of the men whose machines were shut down during the repairing and station him at the starter instead of one of the repair gang, the idea being to have a man there who pays strict attention to the duty he is performing. Of course, if this cannot be done, the next best method is locking the starting box.

GIVING BONUSES TO ENCOURAGE SAFETY

REPLIES to the question below are requested for publication in SAFETY ENGINEERING:

"I should be glad to secure information on the principle and practice of giving bonuses to the men as an inducement towards carefulness and the reduction of accidents. Some advocate this practice and yet there are a great many plants that are not giving bonuses to their men in connection with safety work. This is an important subject and there is a principle involved. The experiences of those who are employing this principle and the reasons of those who are opposed to it would be helpful to a proper understanding and valuation of the bonus plan."

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Prizes for February Articles

First Prize. No. 265. F. M. Babbitt, Safety Director, Columbus Railway Company, Columbus, Ohio.

Second Prize. No. 267. H. B. Adams, Safety Supervisor, Aurora, Elgin & Chicago Railroad Company, Aurora, Ill.

Honorable Mention. No. 266. Mrs. Alice M. Rhodes, Winona, Minn.

Another meritorious article was contributed by Joseph E. Jackman, Safety Engineer, Pittsburgh, Pa.

Comments by Members of the Committee

No. 266 brings "Safety First" home. How many of us who would not hesitate to recommend to some factory owner repairs that are overlooked where our own loved ones are endangered? Every housewife should read this very meritorious article.

My vote is for 265. The methods he points to should be effective in getting men to do what is wanted of them, and getting them to do what should be done.

My vote is for 265, in which it is truly said that keeping up the interest in safety work is "the one thing, accomplished, that inevitably brings success." And the more work we do the more we realize, to quote the late Elbert Hubbard, "that success consists in traveling hopefully but never arriving."

My selection is 266 for the reason that it covers much ground and for the illustration of ways and means to overcome careless accidents, also because the author has selected the "home" as the "proper place and best place" to teach and practice safety work and safety methods, and has explained the ways to eliminate all of the unnecessary accidents. When it becomes a habit, "or a duty as it should be," for parents to teach their children how to be careful, how to prevent accidents, then we shall find that the number of accidents will be reduced to almost nothing.

I think every one who has safety at heart should co-operate with the writer of 267. Have safety explained in the schools. Let us write to our school boards and try to have safety explained if only for five minutes. I think it is as important as any study in our grammar schools and high schools.

Not referring to awards of prizes for February articles but to "The Evidence as to Alcohol" published in the January number, I desire to say that I have been a foreman for 18 years and I have seen a good many men come to work under the influence and some that had only a glass or two, and I have yet to see the first one that was not shaky, or whose mind was on his work. From my own experience I know that drink is no good for any man. I never drank much but when I drank only a small glass I felt a little dizziness and when a man is dizzy he is no good among machines. I am pleased to say for the last three years I have not touched a drop and although I am getting older I am steadier than when I drank a glass of beer once a week. I, therefore, consider it good for the interest of safety not to touch anything that affects the nerves.

I cast my vote for 267, as the writer has my views exactly. I have been a safety engineer for nearly 5 years, but if I could find today a school of safety engineering I would lay down everything and take a course, as this is what we need. Safety can never amount to much without education.

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The Fight Against Fire

Conservation of Life and Property by Safe Construction, Fire Prevention Methods and Fire Protection

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles, Suggestions, etc., relating to Safe Construction, Fire Prevention and Fire Extinguishment. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 120 —ELIMINATING CARELESSNESS. It is suggested that the excessive number of fires which occur in any great city can be eliminated to a certain extent by charging each individual on whose premises a fire occurs a certain amount of money, designated by law. The sum should be sufficient to cover the cost of the fire department extinguishing such fires, where there is reason to believe—and it can be proven—that the fire was caused by carelessness on the part of the occupant, owner or whoever may be responsible for such premises. From official reports it seems that the majority of fires in the great city of New York are caused by carelessness. If the people are aware of the fact that they will be obliged to compensate for the extinguishment of any fire that they may have caused by negligence, they will be more careful; of that there can be no question. They might then turn their attention to the "Fight Against Fire" rather than to practice fire prevention after the fire occurs. I imagine a somewhat similar law relating to chimney fires could be enacted to cover the latter class of fires. Both clearly demonstrate carelessness.

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No. 121 —CHEMICAL EXTINGUISHERS. Do you own one or more chemical extinguishers for your home or store? If you do not, you should, for it is a most efficient and ever-ready apparatus, inexpensive to maintain.

If you have one or more what do you know about them? Do you know how they operate and the theory of their efficiency and how to care for them to keep them in good condition? If not, you should.

Two sorts are in general use, not considering the so-called "dry powder" extinguishers as "chemical extinguishers" at all. The dry powder affairs consist of tin tubes filled with baking soda (soda bicarbonate) to which small quantities of other substances have been added, mainly to disguise the contents and to prevent lumping, for the pure article is hygroscopic, gathers moisture and forms into lumps readily. They are completely discredited by all bodies of underwriters and all public associations concerned in fire protection, not that they are not useful under certain possible conditions but such conditions are rarely met with and when they are, other apparatus serves the purpose better. Then too, persons having apparatus marked "Fire Extinguisher" do not discriminate. The holocaust of the Iroquois Theatre in Chicago was traceable to a dependence upon dry powder extinguishers in a situation where they could not by any possibility be used with effect.

The first of two common sorts is the "Upset" type, which is generally a metal cylinder closed at the top by a metal cap, holding 2½ gallons of liquid. The liquid is a strong solution of bicarbonate of soda in water. Above the liquid is suspended a bottle with a loose stopper containing sulphuric acid. Inverting the machine allows the acid to fall into the solution where it combines with the soda, evolving large quantities of carbonic acid gas (carbon dioxide) the residue being sulphate of soda. This produces great pressure, forcing the liquid contents through the small hose with great velocity. The liquid carries with it the sulphate in suspension but very little of the gas.

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The action upon fire is mechanical. If a stream of water at slow speed is thrown upon a fire much of it is evaporated and lost in passing through the envelope of heated gases and flame that surrounds the actual seat of the fire in the incandescent material.

Water in conversion to steam absorbs an enormous amount of heat and consequently cools by its evaporation whatever it is thrown on. Therefore, if a small stream of water can be thrown with sufficient force and velocity to pass through the flame and gases quickly enough to suffer little loss it will exert its whole effect on the burning mass, cooling it below the point of combustion.

This is what actually happens when the extinguisher stream is directed upon a fire. There is little or no effect from the small amount of carbonic acid gas in the water but the sulphate (which appears as a white powder on evaporation) is a good retardant and to some extent retards reignition.

Such extinguishers are approved for all fires in organic material (wood-fiber, etc.), especially for fires where water must be thrown from a distance of over ten feet or upon an overhead fire. They are of little or no value upon oils, gasoline or electrical fires, but the vast majority of fires are in the first class.

Extinguishers require recharging annually (keeping a record upon a tag attached to the machine) and should also be recharged after exposure to severe cold, especially if frozen ever so little, because cold is likely to precipitate much of the soda and weaken the solution.

They *must* be protected from freezing. The soda retards this a little but they will generally freeze at 24° to 26°.

There are some variations of the general type in which non-freezing solutions are used, or the acid is contained in a closed receptacle which is crushed to release it, but these are not in general use.

The second type is the extinguisher using carbon tetrachloride. The theory and action of this is totally unlike that of the upset type. The size and contents are much less and the force of discharge is caused by means of a small pump in the machine. Tetrachloride acts upon a fire by evaporating into a considerable volume of heavy non-combustible gas which is relied upon to exclude air (and oxygen) from the fire. Like carbonic acid gas it simply smothers by depriving the fire of air.

This type of extinguisher is valuable when the fire is so located that the gas will be retained upon the point of combustion. The power of cooling by evaporation is much less than that of water. If the fire is large enough to produce strong currents of air the gas will not be retained, but upon small fires under these limited conditions it does good service. Being an absolute non-conductor of electricity it is (probably) the only entirely safe form to use upon electrical fires and is therefore the type best suited to power stations. It is effective upon gasoline fires, especially in small tanks and therefore is suited for use in garages and upon automobiles where the upset pattern is impracticable. The National Board of Underwriters' regulations require specific approval of locations and use of this type. This type does not require recharging at any stated intervals as the tetrachloride is unchangeable and does not freeze at a temperature at all likely to be encountered.

It will be seen that each type has uses for which it is especially suited *and that neither one can fulfill the proper functions of the other.*

Consequently, if you have extinguishers make sure that they are of the proper type for your use.

Do not buy extinguishers upon the statements of advertisements or upon the representations of salesmen. It is a salesman's business to sell his goods; it is *your* business to select the proper article. If you are the least in doubt consult the engineers of your local fire insurance organization or apply directly to the officers of the National Fire Protection Association for advice. Remember that, despite whatever statements may be made to the contrary by people interested in selling apparatus, neither type is approved fully for *all* conditions. If you buy upon expert advice you are sure to buy rightly, for you get not

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only expert but *wholly disinterested* advice.

Do not buy *any* extinguishers that do not carry with them evidence that they are of a type and make approved by the National Fire Protection Association. All such machines have a permanent label affixed which is your only protection. The National Fire Protection Association is the only organized body for testing apparatus upon an absolutely disinterested basis, with the protection of the public solely in view.

Every dwelling should have at least one extinguisher and every store several, *in addition* to pails of water. There are many fires where water cannot be thrown from pails.

* * *

No. 122 MATCHES.—At the time of the Indians in America, fire was obtained from sparks caused by striking stones together. Thin, inflammable material was kept at hand which would ignite from the sparks, but often considerable difficulty would be experienced in getting the flame. Either the material would be too moist for ignition or the wind would be too strong. These Indian fires were kept burning continuously and there were watchers to guard them and to put on additional fuel from time to time. Wise Indians knew what a task it was to start new fires so they were always alert when fires burned low. This manner of securing fire was practiced until flint and steel were found to be better spark producers.

About the year 1800, a "chemical match" was used which was made of potassium chlorate. The friction match appeared in 1827 and ever since, the "Match cause" has usually headed all fire records. Matches have caused many fires which have been otherwise recorded.

The kind of match which is now most commonly used and carries the deadly "after-glow" in its splint or stick is the parlor match. By "after-glow" is meant the hot coal in the splint after the flame has been extinguished. Parlor matches are packed in pasteboard boxes carrying usually 500 matches each, and are sold mostly to the poorer classes. These people seem to think that the parlor match is cheaper than other kinds but this is questioned. A small match called the "safety" is about the same in price and is much safer to use. The head of the parlor match is composed in part of phosphorus, chlorate of potash, glue and flint. When rubbed on any surface, or when stepped on, the match will explode in ignition often throwing off hot portions of the head. Thousands of fires have been started from these flying heads and many people have been severely burned by having their clothing set on fire in this manner. The sooner this match is discarded by the public, the better it will be for all.

Another type of match which is a slight improvement over the parlor match is called the sulphur match. Its head is composed in part of phosphorus, sulphur, glue and flint. As it contains no chlorate of potash, the flying hazard is eliminated. It can be ignited by rubbing on any surface or by stepping on it, but it will not crackle nor fly because of the absence of the chlorate of potash. This match is the only one whose splint is not paraffin dipped. Paraffin is used in other matches to convey the flame from the head to the wood, whereas the sulphur flame burns long enough to ignite the splint itself. Disagreeable fumes are given off by this match for the first few seconds after striking.

A third match is the "double dip" or "bird's eye" match. It is a more recent invention and is composed of two heads or dippings. The first dipping is in a composition of sulphide of antimony, chlorate of potash, whiting and glue. When this is dry, it is dipped a little way into a composition of phosphorus, chlorate and whiting. This second dipping makes the sensitive tip for the friction ignition. When lying flat, the double dip match is not easily ignited unless crushed down to the sensitive tip. Boxes of these matches have been known to ignite from a fall or from heat. In some instances where heat has set a box on fire in a case, the fumes from the matches themselves have smothered the flames because of the absence of oxygen in the case to support combustion. The

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head of this match does not fly when ignited, neither does it snap or crackle. Both the sulphur and the double-dip matches have qualities preferable to the parlor match.

The last to be mentioned is the safety match. Safety matches are generally smaller in size and are packed in small pasteboard or wooden boxes of the shuck and tray type. This match is ignited by striking it on the side of the box or shuck. The match head contains the chlorate of potash and the box the phosphorus so that when the two are brought together, the ignition of the match occurs. With this match, there is no danger from mice, no danger in its being stepped on or from rough handling and a minimum flying hazard to the head. As long as match and box are separate, this match is a harmless article. It is the least liable to ignite under heat conditions. It will not flame under 354 degrees Fahrenheit as compared with the double-dip at 261, the parlor match at 195 and the sulphur match at 175.

Most of the splints for domestic matches are of white pine wood but bass and cottonwood are sometimes used. White pine wood is the only splint that is cut round while the bass and cottonwood and the fir and aspen splints used for foreign matches can only be cut square. White pine splints hold less live coal after being extinguished than any of the other woods and the pine heads are less likely to drop off. The safety match has almost always a chemically treated splint to prevent afterglow. Sometimes the parlor match has such treatment but the other two types never have. This afterglow of a discarded match is the cause of numerous fires.

A foolish habit of some persons is to light a match and search in a closet for a piece of clothing or other article. Either the match head falls off or the flame is held unconsciously too near some other clothing. Matches used in closets have caused many disastrous fires in dwellings. The fires are not usually detected at once and when discovered they have burned to such an extent that the insurance adjuster has difficulty in settling the loss.

Matches are used in many ways to search for lost articles and also to light the gas in show windows in stores. Little thought is given to them after the article is found or the show window gas is lighted. Often some inflammable material in the window becomes ignited and before the fire can be extinguished, it has communicated to the store.

"Mice and matches" have caused dozens of "Unknown" fires, and a match dropped in a stable is almost sure to cause trouble. A fire, thought to have been caused by a gas jet or a lighted candle, is generally caused by the match used in the beginning. A match is often thoughtlessly struck in the presence of invisible vapor which leads to quick destruction, and gas leaks are often found too quickly by the use of matches.

In many instances, cigar or cigarette stubs have been blamed for fires when it has been the discarded match with its deadly afterglow. It is also true, though, that "Smoking" is one of the headliners on fire cause records. Many fires have occurred in places of public assemblage after these places have been left alone, and it is thought that the discarded match is to blame.

Fires in warehouses and storage houses are often caused by match cases. They are not believed to be from spontaneous combustion but from the lack of attention given to broken packages of matches. Fireproof receptacles should be kept for storing broken lots of matches.

This should also be done in small retail stores where matches are found under counters, on shelves and other open places. A tin bread box is an ideal match container in such places. Matches in large quantities should be kept in fireproof vaults as a safeguard from the immediate hazard and also from the adjoining building hazard, although matches kept in their original cases are not an exceptional hazard in themselves.

After using a match, a good habit to form is to break the splint before throwing it away. This is often questioned as to the reason. Usually, the time it takes to break the splint is time enough for the fire or hot coal to be extinguished.

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Prizes for January Articles

First Prize. No. 116. *Samuel M. Rehfield, Lieutenant, New York Fire Department, Corona, L. I.*

Second Prize. No. 117. *Roy W. Alsip, Assistant Fire Chief, Champaign, Ill.*

Honorable Mention. No. 118. *Herman B. Escher, Astoria, L. I.*

Another meritorious article was contributed by Earl Casey, Assistant Superintendent, The Texas Company, Lockport, Ill.

In the award of prizes for September, 1916, *articles Lieutenant Rehfield was credited with the authorship of Article* 115 *which won second prize. This was an error as the author of No.* 115 *was Mr. C. E. Worthington of Boston. This correction should be placed on record for accuracy and as a matter of justice to the contributors named. All articles for this department of SAFETY ENGINEERING are numbered and registered as received. A clerical mistake occurred in the number of Lieutenant Rehfield's article.*

Comments by Members of the Committee

The writers of January articles put up a hard problem for decision. From the point of preventing spread of fire once established, 116 certainly leads; from the point of prevention merely, 117, and in fact the other two, excel in their particular fields. I am inclined to believe, however, that there is, on the whole, on the part of the public, less objection to electrical inspection than to fire walls and conversely more unthinking opposition, even from architects, to the subdivision of areas than to inspection. Therefore, I decide for 116 as being on the whole more pertinent.

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It is, of course, essential that new installations of electric work be inspected; but not enough attention is given in *any* city to the periodical resurvey of these equipments. Aside from natural deterioration, electric wiring and appliances are subject to severe abuse by the schoolboy, by the janitor, by the chauffeur, by the tenant himself. In short by anyone who has a rudimentary knowledge of electricity sufficient to enable him to join two wires and complete a circuit. Probably flexible cord stands second in the list of causes of electrical fires—running close behind the flatiron.

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I have chosen 118 because it has so well contrasted fire-fighting and fire prevention and shown why we have the former when we need the latter and what we must do to get out of the "fiighting" class into the "prevention" class. It's a matter of preparedness.

❦ ❦ ❦

Article 116 is good. It tells us the value of a fire wall in buildings or other dangerous places which in case of fire stop the spread of same. The fire wall has proven in many cases the means of checking fire, as in places where the building is frame and also in buildings that contain combustible material. The writer of 116 tells of conditions firemen come in contact with and also states the good points of the same.

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EDITORIAL

More Definite and Democratic

SAFETY work is to make its best progress, in the future, in two ways—it will become more *definite* and more *democratic*. Views expressed by Mr. A. B. Jones, Director of Plant Administration, B. F. Goodrich Company, Akron, Ohio, recently communicated to SAFETY ENGINEERING, constitute an intelligent "look ahead" in the safety movement. We are pleased to quote Mr. Jones' comments in full, as he says a great deal in a few words: "Industry must consistently endeavor to promote the safety of all who are employed in the common service of production. The 'Safety First' movement is an attempt to prevent all accidents. The first few years of its life have naturally been spent in experimentation and in safeguarding the most obvious sources of injury. Only now are we beginning to reach a point in our knowledge where we can definitely plan campaigns that will effectively conserve the life and limb of all engaged in manufacture.

"Accidents have already been greatly reduced both in number and in severity. But preventable accidents still occur. Our limited success in the past makes our conviction the more sure that all accidents are preventable, and that their presence in any factory is a challenge to the intelligence of the management and the men. In the future, every manufacturer must work more definitely along two lines:

"(1) *He must see to it that machines are properly safeguarded at the time of purchase.* I believe that the time will come when industrial concerns will make the matter of adequate safeguards a requisite in the purchase of machines equally important with the consideration of price and general utility.

"(2) *The movement must be made sufficiently democratic to arouse the enthusiasm of the employes,* and to make them gladly assume their full share of responsibility for accident prevention. Methods for doing this will vary under the different systems of industrial management. Whether it be done through shop committees or a centralized executive staff making full use of educational bulletins, lectures and house publications, is only relatively important; the great essential is that it be done.

"Accident prevention is but one phase of the general problem of industrial relations. Safety work must be intelligently co-ordinated with health work, and with the effort continually to adjust labor grievances and to improve labor conditions. Business can succeed only by securing the good will of the consuming public through the intelligent and enthusiastic co-operation of all who serve it. Prevention of accidents, the conservation of health, the promotion of efficient workmanship and right living pays, in a commercial sense, since they are fundamental factors in securing the good will and the full productivity of the workers and thereby contribute directly to the success of the organization."

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Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all lines of industry to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

New York's Welcome to A. H. Young

ON Monday evening, February 26, the New York Council of the National Safety Council tendered a dinner at the Hotel Astor, New York City, to Arthur H. Young, the new director of the American Museum of Safety.

A number of the trustees of the American Museum of Safety were present, among whom were Arthur Williams, president of the American Museum of Safety, Dr. F. L. Hoffman, and Dr. Doremus. Members of the New York council were present to the number of sixty-three. The gathering was notable for the fact that it was a coming together of two great institutions in the safety field, namely, the National Safety Council and the American Museum of Safety.

M. A. Dow, president of the New York Local Council, toastmaster, paid a high tribute in his opening remarks, to the work the American Museum of Safety is performing in enlightening those who visit the museum with practical information on the most approved methods of mechanical safeguarding in the industries. Mr. Dow said that the dinner tendered to Mr. Young and the trustees of the American Museum of Safety was an expression of the warm feeling the National Safety Council has towards the American Museum of Safety and he trusted that the two institutions would join hands henceforth and co-operate in the great work in which they are both engaged, namely, conserving life and property against destruction by unnecessary accidents.

The address of welcome to Mr. Young by the New York council was by W. C. Wilson, chairman of the Entertainment Committee of the Council. After some witty remarks as to why he was selected for the address

The New York Safety Council Dinner at the Hotel Astor in February

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of welcome, he said the safety men of New York should feel gratified that the American Museum had made such a wise selection in their new director, that the New York council stood ready at all times to co-operate with the American Museum of Safety; and as Mr. Young was one of the founders of the National Safety Council he did not require much of an introduction to safety men. The New York council heartily welcomed him, he was no longer a stranger within their gates. Under his management the American Museum of Safety would undoubtedly make great strides and thereby advance the cause of safety in the field in which the New York council is laboring. Mr. Young has the hearty good wishes of the New York council in his new career.

The introduction of Mr. Young by Mr. Dow was greeted with sustained applause. Mr. Young said that he had been associated with the American Museum of Safety for some weeks and had been disappointed in not having met all the members of the New York council before this at the museum. He said that the co-operative spirit which had been extended to him in New York was an inspiration, and he invited all members of the New York council to visit the museum and become acquainted with the fine collection of industrial safeguards, to be seen there. He described some of the exhibits which he felt sure would repay a careful inspection by all safety men. He called attention especially to the exhibit recently installed by the Aetna Life Insurance Company which had been assembled for exhibit at the Panama-Pacific Exposition and had cost not less than $15,000. It consists of a model of two machine shops, one dangerous or unguarded and the other equipped with all necessary safeguards. Mr. Young said that the policy of the American Museum of Safety henceforth would be one of close co-operation with the National Safety Council and in his judgment the splendid co-operative spirit he could see around him promised a great future for the two great institutions.

Mr. Price, field secretary of the National Safety Council, gave an interesting talk on the field work which he has been engaged in during the past few months and said that excellent results had been secured by forming a New England Council, headquarters in Boston, which took in some 25 towns in the vicinity of Boston. He thought a similar plan could be put in operation for New York City whereby the New York council could extend its influence to surrounding cities. This suggestion was favorably received and in all probability such a campaign will be started, with Mr. Price's assistance, in the near future.

The next speaker was Arthur Williams, president of the American Museum of Safety. Mr. Williams paid a high tribute to the work the National Safety Council is accomplishing and said that the remarkable growth of this institution reflected the highest organizing and executive ability and loyalty of the members. He had never doubted that the two institutions could co-operate to the advantage of both and now the time had come, it was his happy privilege to pledge the full co-operation of the American Museum of Safety with the National Safety Council. Mr. Williams made clear that the work of the American Museum of Safety was to be considered from an economic and not a philanthropic viewpoint. Safety work pays. It is no longer questioned, as a profitable business proposition. It has received wide endorsement from those best fitted to judge, namely, the largest employers in America. Mr. Williams recalled the words of Judge Gary, chairman of the United States Steel Corporation, at a recent safety meeting at which Judge Gary stated that safety pays. Mr. Williams stated that he was happy to meet the New York council under such pleasant circumstances and it was a source of pleasure to see the new director, Mr. Young, welcomed by the New York council so cordially and agreeably.

The next speaker, Dr. Frederick L. Hoffman, needs no introduction to safety men. It is to Dr. Hoffman more

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than any other man in America that the safety world is indebted for statistics on accidents. As statistician of the Prudential Insurance Company, Dr. Hoffman is known throughout the country for the remarkable contributions he is continually making to the cause of safety. He seldom misses an important safety meeting and is always there with the figures. Dr. Hoffman made an impressive speech and stated that the cause of safety stood foremost as the highest attainment of the efforts of mankind. While there had been reared to art, literature and science, great buildings, costing enormous sums of money, for the entertainment and enlightenment of the people, there had not yet been contributed a fitting building for the great cause of safeguarding human life and limb. Dr. Hoffman stated that the safety movement is yet in its infancy. Unquestionably it will come into its own, in the near future, as the most valuable and important effort any man can undertake. The work of safeguarding human life and limb is a noble cause—there is no nobler one. Every man who is engaged in that work should feel the pride and privilege in contributing towards reducing the needless waste of life and limb. Dr. Hoffman said that already through the efforts of the American Museum of Safety and the National Safety Council, thousands of industrial workers are alive and well today who otherwise would be dead, or disabled for life. As a member of the executive committee of the National Safety Council and as a trustee of the American Museum of Safety, Dr. Hoffman stated that he was deeply concerned in the success of both institutions and he was sure that rapid progress could be made by both through co-operation.

Grade Crossings in California

UP to January 1 the California Railway Commission had procured inspections and reports upon about 2,000 grade crossings —railways, towns, cities and automobile associations assisting in the surveys. About 8,000 other grade crossings remain to be inspected. Recommendations for removing dangers are sent to the public authorities. The kind and number of recommendations already made are as follows:

To install human flagman	4
To install automatic flagmen or bells	66
To install gates	4
To place, remove or change position of signs	449
To cut brush or trees or trim trees	319
To remove buildings, billboards and other obstructions	30
To grade approaches	27
To change alignment of road	4
To grade between rails	14
To change grade of track	1
To close crossings	92
To separate grades	18
To change location of crossing	1
To change to private crossings	7
To operate trains at slow speed	2
Other minor recommendations	62
Total	1100

The cost to the railroad commission to date, including the preliminary work which will be spread over the State-wide investigation, has been approximately $2.40 per crossing. The survey will be extended to every crossing in the State. Whatever can be done to make the existing crossings safe will be done. Gradually the crossings where a separation of grades should be effected will be considered in separate proceedings.

Slipping and Tripping Hazards

AT a meeting of the American Society of Safety Engineers, January 31, 1917, the following resolution was passed: "Whereas, slipping and tripping hazards are a most serious menace and prolific source of industrial and public casualties, causing a great economic waste and untold suffering, which it is desirable to reduce or prevent, therefore, be it

"Resolved, That it is the sense of the American Society of Safety Engineers to recommend suitable provisions to eliminate existing and to prevent future slipping and tripping hazards; and be it further

"Resolved, That surfaces of cast iron or steel on which people must walk or work constitute dangerous hazards which should be prohibited unless an effective anti-slip element is embodied in the wearing surface of such tread materials."

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Local Safety Activities

REORGANIZATION of the local council of the National Safety Council at Pittsburgh. Successful work of safety patrols in the Allentown (Pa.) public schools. Lectures in Elizabeth (N. J.) public schools by Carl M. Maschmeyer, educational school lecturer of the Public Service Railway Company. Safety patrol among Philadelphia school children, enlisted by the initiative of the Philadelphia Rapid Transit Company. Safety movies in the Chambersburg (Pa.) public schools. Safety signs erected near the approaches of public school buildings in Cincinnati by direction of Safety Director Friedlander. Cash prizes of $630 in gold awarded to employes of Cambria Steel Company, Johnstown, Pa.

Six thousand school children, assembled in a vast auditorium, listened to lectures on safety by Dr. F. E. Fronczak and M. A. Dow, general safety agent of the New York Central lines. Officials of the Long Island Railroad Company witnessed safety films in the Y. M. C. A. auditorium of the Pennsylvania Terminal, New York City. A safety dinner in East St. Louis was attended by more than 300 superintendents and foremen of East St. Louis industries. A citizens' police in Berkeley, Cal., whose members are unknown to drivers of automobiles and other vehicles, is accomplishing much for safety in the public streets. In Depew, N. Y., the clergy, public schools, employers and workmen are giving support to safety education. Every car in the New York subways is carrying safety warnings, conspicuously displayed.

Safety Outside the Plant

A GOOD industrial safety organization will not content itself with the prevention of accidents for which the company may be held responsible. More than one concern is urging its employes to carry on the movement when off duty. One simple but effective way to spread the safety gospel is for each employe to instruct his own children in what they should avoid doing and trust to the children to spread the news to their comrades.

There was a man who fancied
That by driving good and fast,
He'd get his car across the track
Before the train came past.
He'd miss the engine by an inch,
And make the train hands sore.
There was a man who fancied this;
There isn't any more.
—Safety Bureau, E. P. & S. W. R. R.

Risk of Storing Soft Coal

THE National Fire Protection Association has issued a bulletin giving simple rules for minimizing the risk of storing soft coal. It advocates storage away from the plant in low piles of large area; piling wet coal around the edges of the pile where air can get to it, and where it is necessary to store large amounts the insertion of large wrought-iron pipes in the piles as they are built up to allow air to get into the pile, and prevent spontaneous ignition.

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Unique Safety First Feature

THE Chicago, St. Paul, Minneapolis & Omaha Railway has a comprehensive "Safety First" system of which one of the most important and unique features is the night track walker.

Regardless of weather conditions, the night track walker patrols his "beat" of six miles (the approximate section of track given each such employe) twice each night. That is, he makes a round trip over his section nightly. He registers at each end of his section, so a check is had on him always.

The night track walker carries a large reflector lantern which enables him to see both rails at once as he walks between them. He is also armed with a fusee, track torpedoes and a piece of red bunting, making a red light when put around his lantern. He is thus triply prepared to give warning of danger to approaching trains in event of finding damaged rail washouts or other elements of danger. He can also warn an approaching train in case of accident to the automatic safety block system.

This night inspection system, in addition to the twice-a-day inspection, is a continuous source of encouragement to engineers and gives them confidence in running at full speed on the darkest and stormiest night.

Society of Safety Engineers

THE monthly meeting of the American Society of Safety Engineers, New York, on March 31, is to be devoted to a lecture on the Panama Canal by H. P. Furlong, illustrated with several hundred lantern slides. Mr. Furlong was in charge of the lock construction at the canal and most of the slides are reproductions of photographs taken by him. The society has offered the services of its individual and collective membership to the government of the United States, either in manufacturing or field activities, in case of war. The members of the society compose a body of experts trained and skilled in safety methods as applied to all branches of industry, especially the construction of railroads, bridges, tunnels, subways, viaducts, steel, stone and frame buildings, ships, boilers, engines and machinery, excavating, backfilling, shoring, marine, civil, mechanical and electrical engineering; the maintenance and operation of manufacturing plants, railroads, mines, boilers, engines, electrical generating plants and transmission lines, automobiles, munition plants, chemical laboratories, etc.

"Full-Crew" Law Causes Wreck

THE wreck of a freight train and Adams Express train, which occurred on February 25, 1917, near Bristol, Pa., is believed by the management of the Pennsylvania Railroad to furnish a practical demonstration of the truth of the contention that the "extra crew," or so-called "full crew," laws not only fail to increase safety, but actually encourage indifference to duty.

The wreck was caused by a "hot box" which burned off a journal of the 11th car from the engine of the freight train, derailing that car and ten others. An Adams Express train, about to pass on the adjoining track, in the opposite direction, ran into the derailed freight cars, with the result that the fireman and three attendants on the Adams Express train were killed.

The freight train was manned in accordance with the terms of the "extra crew" laws. It consisted of 33 cars, the 3 cars over 30 requiring the employment of an additional brakeman.

The inquiry showed that in the course of the run from Waverly, N. J., to the point near Bristol, Pa., where the wreck occurred, a distance of about 54 miles, the conductor, the flagman and the rear brakeman—the latter being the employe carried to conform with the "extra crew" laws—never left the cabin car at the rear of the train, except during two brief stops. On each of these occasions, the conductor and rear brakeman claim to have walked beside the train a distance of about five car lengths from the rear.

The head brakeman rode in the engine cab from Waverly to the point of the accident.

In the opinion of the officers of the

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company, who conducted the investigation, the accident would not have occurred if the crew of the freight train had given proper attention to duty.

The evidence shows that the oiled waste in the "hot box" was blazing brightly as the train passed through Trenton. It was observed by at least two employes in the yards there, and should easily have been apparent to the men in the cabin car and engine had they kept watch forward and backward along their train. This is especially true from the fact that the accident occurred before daylight. The waste must have begun to burn miles before Trenton was reached, and the smell would have been apparent to an attentive crew for some time before flames appeared.

The management believes that the responsibility for the wreck rests with the entire crew of the freight train, with the exception of the fireman, indifference to duty being shown by all the other members, including the additional brakeman carried in conformity with the "extra crew" law. Disciplinary measures deemed suitable under the circumstances have been applied in the cases of all the delinquent members of the crew.

How to Walk Down Stairs

THE safety man will always be on the alert for possible dangers and be ready to cope with them in as efficient a manner as possible. If you walk down stairs with your hands in your pockets you are taking chances on a slip that may result in a serious fall which might be prevented if your hands were free.

Kansas Fire Prevention

THE educational work of the Kansas fire marshal's department was conducted in 1916 very much as it was in 1915. Bulletins were issued monthly and other literature sent out. Fire-prevention addresses were delivered from time to time and a general campaign of education along fire-prevention lines carried on. The effectiveness of the department could be increased, State Fire Marshal Hussey says, if funds were available with which to send the man in charge of the educational work regularly to the high schools of the State and to other bodies, where the story of the fire waste, its causes and how it can be reduced, could be impressed upon the minds of those who can help most to check the tremendous drain that is sapping the nation's resources.

Buffalo Safety Rally

BETWEEN 12,000 and 13,000 Buffalo workingmen, their wives and children, attended two sessions of a public safety rally held by the Buffalo Council No. 28, of the National Safety Council in the Broadway Auditorium, Saturday, February 24. The afternoon session was arranged especially for school children. The evening program featured industrial and traffic safety. City-wide interest in the Safety Rally was shown early in the campaign. The mayor and councilmen of Buffalo's new commission government, the superintendent of police, the Buffalo City Federation of Women's Clubs, the Buffalo Boy Scout Federation, and practically every manufacturing or public service company in Buffalo and vicinity were interested and enthusiastic boosters.

The moving picture program was the backbone of the rally. Too much cannot be said of the telling educative effect of the fine safety films shown. The afternoon program included speeches by Health Commissioner Fronczak of Buffalo, City Commissioners Heald and Malone, Mrs. Henry Altman, president of the Buffalo City Federation of Women's Clubs, and Mrs. Anne L. Hansen, superintendent of the District Nursing Association of Buffalo. The Boy Scouts staged a field demonstration of first aid work which captivated the juvenile audience completely.

In the evening, City Commissioner Charles B. Hill presided. The Buffalo police department staged a very interesting first-aid and life-saving drill and demonstration. Dr. Fronczak spoke again on industrial health and safety, and Marcus A. Dow, general safety agent of the New York Central Lines and vice-

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president of the National Safety Council, closed the evening program with a speech on "The Human Elements in Safety" and his famous railroad safety film, "The House That Jack Built."

The rally was a financial success. Money was raised by selling complimentary tickets to interested employers at three cents each. Letters announcing the plan were mailed to every plant in Buffalo. The response was beyond expectation. As admission was free, the ticket was just an advertisement. It worked.

Safety Nets for Builders

THE safety department of the Industrial Accident Commission of California is responsible for the introduction of safety nets in San Francisco for buildings under the course of construction. The nets are used in some of the large eastern cities, and there are European countries that require a similar safety precaution. It is intended to secure the co-operation of California's building contractors in order that the safety nets may come into general use. It has been found that the California law is impracticable that calls for the temporary flooring of all buildings under construction. High balconies, galleries, arch-trusses of theaters, auditoriums, churches, armory buildings, railroad trainsheds, towers, viaducts, bridges, domes and cupolas on which men are engaged are not safe in case men fall. The distance to the floor is too far. The safety net supplies the need. A man falling many feet into a net is uninjured. The cost of the net is nominal and it is easily adjusted and removed. It can be readily transported from one job to another.

First Aid in Cabooses

THE Chesapeake & Ohio has adopted the suggestion of one of its conductors that all caboose cars be supplied with first aid packets for the use of employes. In order to reduce the number of accidents caused by persons who do not intend to travel but go aboard and jump off after the train has started, the passenger department has ordered station agents and conductors to require all persons boarding trains at terminals and stations where trains stop for some time to show tickets before boarding the train.

Disciplining for Safety

AN employe of the Youngstown Sheet & Tube Company, breaking a lump of coal with a sledge, failed to wear his goggles. A small piece of coal entered his eye. Instead of going to the hospital to have it removed and the eye properly treated, he neglected the injury. He did not notify his foreman, who, had he known of the injury, would have sent the employe to the hospital. As a result of this neglect the eye became inflamed and irritated and the man lost 7 days' time. The man not only failed to report his injury to his foreman, but failed also to go to the hospital. Upon his return to work he was laid off for 7 days as an object lesson to himself and others.

New Ideas for Old Ones

IF one wishes to obtain satisfactory results in reducing industrial accidents, says H. E. Hoagland in *American Industries,* he must change the habits of his workmen. This is a difficult task. If one does not believe it, let him try to change his own habits. But it can be done and it is being done. At least the success thus far attained is sufficient to encourage us to further efforts. Publicity alone is not sufficient to effect this change of habits; but it will help very materially in reaching that end. First we must use the power of suggestion and substitute new ideas for the old. It is well to begin a safety campaign by calling together the workmen, by departments, if the plant is large, and announcing that, with their help, it is expected to reduce accidents in the plant. Be frank with them and tell them that you yourself haven't done as much as you could to prevent injury to them. If you had you would not be seeking a means of reducing accidents. Be sincere in your promises to do your part toward raising the standard of safe-

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ty in your plant. You can't expect your workmen to spend their noon hours reading long, wordy bulletins. And you do not want them to read such bulletins on your own time. Give them bulletins which carry their messages in much the same manner as do the advertisements which you read from time to time, more or less unconsciously.

Making New Employes Safety Men

THE National Safety Council writes in one of the weekly letters: "One of our members sent the following notice to all superintendents and foremen: 'Scarcity of labor means employment of inexperienced men. When a green man begins work, an experienced fellow-employe must watch him for several weeks—gradually "coach" him as to dangers—and all this without frightening the new employe or exaggerating the dangers of the work. The responsibility of having a new man to look after will tend to make the experienced employe more careful himself. Please give this matter your prompt attention as we wish to hold our accident record down to the lowest possible limit.' This is a good way to help to teach new and old employes to be careful."

Standard Hydrant Fittings

INTEREST is rapidly increasing in the standardization of hydrant fittings and hose couplings, so that neighboring fire departments can assist one another in case of large fires. The Ohio Fire Prevention Association especially has made a notable success of its campaign along this line, and several other State associations have signified their intention of taking it up. In the meantime there have been numerous instances of the need of such standardization and co-operation. J. H. Howland, chairman of the committee on standardization of hose couplings and hydrant fittings for the National Fire Protection Association, asks the co-operation of the State fire associations in its work. He suggests that each State association appoint an active committee on the standardization of hose couplings and hydrant fittings, to follow methods similar to those employed by the Ohio association or such other as they may think desirable. Mr. Howland's committee will furnish suitable blanks upon which measurements of existing hose couplings can be recorded, and as these are reported to his committee, it hopes to discover novel and successful methods of interesting the authorities in the subject, the approximate cost of changing from non-standard to standard fittings, etc. Mr. Howland's committee proposes to bulletin this information to all State fire prevention associations co-operating in the work, and thus to develop a broad and comprehensive campaign.

Numerous Sprinkler Failures

A LOSS of over $36,000 was caused by the opening of a single sprinkler head in the tank house on the roof of the Louis F. Dow Company building at St. Paul. The salvage corps was criticised for not properly caring for the stock, as sufficient tarpaulins were not used and much unnecessary damage resulted. A chimney on the adjoining building had been built against the side of the sprinkler tank house, and sufficient heat came through the bricks to ignite the tank house. The fire was a small one, but it opened one sprinkler head directly over the tank. The opening had been left in the roof to allow heat to come up from the top floor of the building, to prevent the tank from freezing, and the water from the open head made its way through this down through the entire building. The sprinkler system had no supervisory alarm, and the fire started when no watchman was on the premises, there being an interim of an hour and a half between the departure of the night watchman and the arrival of the day watchman.

Losses by the failure of sprinkler systems were remarkably heavy during the past months. The Factory Insurance Association sent a letter to all its policyholders calling attention to a loss of $5,000,000 within a month on three sprinklered risks, the sprinklers being out of commission at the time of the fires.

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The policyholders were reminded that the hazard is greatest when water is shut off, and were urged to install special safeguards whenever the equipment is out of service.

National Building Exposition

AT the Grand Central Palace, New York, during the National Complete Building Exposition, March 5-11, lectures were scheduled as follows:

March 6. National Fire Protection Association Night. Speakers: J. O. Hammitt, Chief, Bureau of Fire Prevention; S. G. Webb, Secretary, Gypsum Industries Association.

March 7. Architects' Night. Speakers: R. P. Miller, Chairman, Board of Standards and Appeals; Robert Wheelright, Editor "Landscape Architecture." Mr. Wheelright's address was on "Some Tests on Building Materials."

March 8. Protective Devices. Speaker: Ira G. Hoagland, Secretary, National Automatic Sprinkler Association.

March 9. Reinforced Concrete and Lumber Night. Speaker: J. P. H. Perry, Engineer, Turner Construction Company. A discussion took place on "Lumber—Its Proper Use."

March 10. Clay Products Night. Speaker: Henry B. Thomas, National Fire Proofing Company. His subject: "Hollow Tile—Its Manufacture and Use."

Railroad Fire Prevention

H. L. DENTON, supervisor of fire prevention for the Baltimore & Ohio System, was connected with the police and fire department of the Long Island Railroad Company in New York for a period of 8 years, from 1907 to 1914. In October, 1914, he severed his connection with the Long Island Railroad to enter the service of the Baltimore & Ohio. From the date of entering the Baltimore & Ohio service until December 1, 1914, he was employed as roadman in the police department. On December 1, 1914, he was promoted to be captain of police of the Wheeling division. On May 1, 1915, he was promoted to captain-police of the Baltimore division, which position he held until his appointment as supervisor of fire prevention on January 1, 1917.

H. L. Denton

Responding to SAFETY ENGINEERING'S request for his views on railway fire prevention, Mr. Denton said: "Fire prevention work on railroads should be conducted along about the same lines as the safety work was conducted, through an educational campaign dealing directly with the employes and holding the local supervising officers responsible for the general housekeeping conditions in their respective territories. The fire prevention campaign on the Baltimore & Ohio has the support of over 300 police officers, whose duty it is to supervise the fire appliances and remedy the existing fire hazards when they come to their notice. By a general campaign, as outlined above, the same effective results can be obtained in fire prevention work that statistics show the 'Safety First' movement has accomplished."

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How the New York Police are Working for Safety.

Street Crossing Dangers

EVERY street crossing is a danger zone for electric cars, automobiles, other vehicles, and pedestrians, says T. A. Cross, general manager of The United Railways & Electric Company of Baltimore. If all people could be trained to exercise proper care, no pedestrian would attempt to cross a street without first stopping, looking, and listening; no driver would approach a crossing except slowly; no automobile would be driven past a crossing without a warning from the horn; and no car would come to an intersection of streets without the motorman sounding his gong one or more times. It is impossible, of course, to train all these different people to be properly careful, but it is possible to have every motorman do his part, and, if necessary, more than his part, to prevent accidents at street crossings.

Red Lead and Fresh Paint

RED LEAD and fresh paint, says the Central Safety Committee of the Pacific Gas and Electric Company, are slowly absorbed into the system from small quantities gotten on the lips or in the mouth. This lead may do no apparent damage for a month, when it will suddenly cause severe pains characteristic of lead poisoning, or it may cause lead palsy. To reduce the danger of lead poisoning:

1. Wipe off all fresh paint or red lead with waste before blowing into pipes. 2. Don't get red lead mixed with chewing tobacco. 3. Wash lead and paint off hands and from around finger nails before eating.

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New England Safety Council

NEW ENGLAND is experiencing a recrudescence in safety activities. Always in the lead in progressive movements, independent efforts for industrial safety so noticeable among the industries of this section are taking on renewed activities as community problems. Meetings of executives at safety luncheons, where plans are laid for extension of the work from the individual plant to the industrial group, to cities, zones, States and divisions are frequent occurrences. Reflecting the activity of their superiors, foremen's meetings and safety committee gatherings are being held amost daily in many of the New England cities, and the cohesion of the work speaks well for the promoters of the present movement.

The New England Safety Council, a branch of the National Safety Council, with headquarters in Boston, is the latest and probably the most ambitious body of its kind in the East, if not in the entire country.

Organized March 7, at the City Clubs, in Boston, it includes among its sponsors a score of the biggest-hearted and broad-minded men to be found in industry today. Its first president, H. G. Smith, vice president and general manager of the Fore River Shipbuilding Corporation, is a man of energy and resourcefulness, and a strong exponent of the doctrine of conservation of the human element. E. B. Saunders, of the Simonds Manufacturing Company, Fitchburg, is secretary, and will be assisted in formative work by David S. Beyer, long known wherever "Safety First" is a slogan in industry. Assistant secretaries are J. M. Larkin, of the Fore River Corporation; Dudley Clapp, of the Federal Light & Power Company, Boston, and D. R. Hawley of the New England Telephone & Telegraph Company. Vice-presidents are: C. E. Paige of the Malden & Melrose Gas & Light Company; B. R. Sheak, general manager Thomas G. Plant Shoe Company, Boston; T. G. Toomey of William Filene's Sons Company, Boston, and F. A. Flather, treasurer of the Booth Mills, Lowell. J. C. Brodhead, of the Boston Normal School, is chairman of the school and college committee; D. S. Beyer of the Massachusetts Employers Insurance Association, chairman of the program committee, and H. A. Hale, of the American Mutual Liability Insurance Company, chairman of the membership committee. A score of well-known business men fill the other offices of the new organization.

The National Safety Council was ably represented by its field secretary, C. W. Price, who is in the East in the interest of the parent organization in the safety field.

Routine Has Its Dangers

"IT is not the long hazardous jobs that cause the most serious accidents," comments the *Safety Bulletin* of Chicago, "because on such work everyone is putting forth his best efforts to prevent serious injury to all connected with the job. It is the familiarity with everyday routine, and a lack of a full appreciation of the hazards which are constantly about that cause many of the serious accidents."

Elementary First Aid for the Miner

THE U. S. Bureau of Mines has just issued its circular No. 23, "Elementary First Aid for the Miner," in Polish, Italian and Slovak, with English translation on the opposite pages. The introduction to the pamphlet states:

"It is the aim of all thinking men who are interested in mines or mining to get as much first-aid training as can be had, and mining companies and miners are co-operating with the Bureau of Mines in trying to have as many men trained as possible. It is felt, however, that at present many persons who ought to take first-aid training do not, especially those who have only recently come from foreign lands and are not able to read nor to speak English. To meet this want the Bureau of Mines prints this circular which treats of only the simplest first-aid needs of the miner. . . . . In most mine accidents a miner is injured at or near the working face where

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no first-aid supplies are at hand. It is the aim of this book to tell the miner how to use brattice cloth, pieces of board, broken ties, bark off of props or posts, wire, coats, jumpers, etc., as aids in dressing the wounds of the injured man."

National Safety Bulletins

WARNINGS published recently in the National Safety Council's weekly bulletins to its members:

A wheel used in wet grinding should not be allowed to stand partly immersed in water. The watersoaked portion may throw the wheel dangerously out of balance.

An employe of the American Steel & Wire Company crawled under a car to escape a shower of rain. The car moved and he lost an arm.

You know better than to do a dangerous act simply to show some one you are not afraid to do it. Be careful.

Dry wood is as hard to find when needed as the proverbial needle in the haystack. Furnish linemen with a safety pick-up. An insulated pick-up allows the handling of "hot" or "live" wires when down, with immunity to the lineman. By using a rope long enough to cover one span, the wire, after being picked up, may he held by the pick-up and tied up in the clear until repairs can be made.

One of the hazards of the band-saw man is that of being bumped into the saw. One member of the National Safety Council has erected a substantial railing about the work-place of the band sawyer and his saw. The machine is carefully guarded and the workman is free from interference. Increased efficiency paid for the railing in a very short time.

A boilermaker, Schenectady, was holding fuller which his helper was striking with hammer. Head of fuller was badly battered and a piece of scale broke off, hitting him in the eye. He should not have used battered tool. He should have worn goggles.

A workman, applying lagging in the erecting shop, was mixing plaster. Some of it flew in his eye. He did not report it until three days later when the eye was infected and had to be removed. He should have reported at once to the shop hospital. He should have worn goggles.

An employe had climbed up on gasholder to connect the steam hose, which is used for heating the water in the holder. He slipped and fell to walk-around, bruising his collar bone. When trouble was first noticed, the employe should have called for assistance. He should have used ladder to reach the hose connection safely. After the accident happened, he should have reported it immediately and not waited until morning. Report made by Safety Committee of Queens Borough Gas & Electric Company: "The hose connection above platform on the syphon cup was in a position to make it quite dangerous for a man making connections at night, and it is advisable to have hose connected to the syphon cup made permanent, and the hose run over the side of the outer railing; this hose to be clamped to rail, and enough slack left in same to allow for the rise and fall of tank. It is also recommended that the steam line be cut down to a height not exceeding five feet above the platform walk. This will enable man to make connections from the platform without any danger of falling."

Breathe deeply, slowly, regularly. Breathe through the nose, not through the mouth. If you are a "mouth breather," you probably have enlarged tonsils, adenoids, or some obstruction of the nose that needs attention. Unless we breathe deeply, part of the time, part of our lungs may become useless. Air is needed by the blood to keep us healthy. Do not force yourself to breathe rapidly. Breathe slowly. Throw your shoulders back.

One of the commonest faults found in new plants is the installation of wrong types of floors. Another is the wrong clearance given railroad tracks. These the safety engineer should be able to correct at a glance when going over the specifications.

Various plans have been tried to interest the individual workman in his own safety. It is very easy to excite his curiosity or cupidity and appeal to family ties is effective for a time, but it requires patience and perseverance on the part of the foreman and superintendent to keep the men steadily up to the safety standards set for the shop. A circular letter distributed to the employes of one of our members offers rewards in the shape of extra pay or time off to the men and bonuses to the foremen. Every month the department having the best record is given time off or extra pay equivalent to sixteen hours time and foremen receive a bonus of 5 per cent of their monthly wages. The plan is an excellent one.

Too Many Boiler Explosions

BOILER explosions are from 5 times to 7 times more numerous in the United States than in England and from 20 times to 35 times more numerous than in Germany according to a recent statement by Dr. F. S. Crum, assistant statistician for the Prudential Life Insurance Company. That the consequent loss of life can be materially decreased by a competent inspection service is shown, he says, by the

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fact that the number of explosions of locomotive boilers was decreased 54 per cent with a saving of life of 87 per cent as the result of the inspection required for locomotives engaged in interstate commerce.

The Late Henry Clay Henley

THE *Journal of the Engineers' Club* of St. Louis published a memorial page in its January-February issue relating to the work of Henry Clay Henley, one of the leading spirits in the fire prevention movement:

The biography of Henry Clay Henley can be sketched in a few brief sentences, since it is but the chronicle of a steadfast man's intense devotion to the work that lay before him. He was born in St. Louis on February 24, 1857, so that at his untimely death on January 20, 1917, he was but little more than a month short of his three score of years, and he should have had before him many more years full of service and kindliness for his fellow-men, and full of satisfaction for himself. In 1881, he first became connected with the Underwriters Salvage Corps in a minor capacity, but steadily won his way toward the top. He left the corps in 1886 to become an inspector for the board of fire underwriters, later becoming their chief inspector and remaining in that position until the board was discontinued in 1899, on account of changes in the State insurance laws.

In 1900, the Fire Prevention Bureau was organized with Mr. Henley as chief inspector, which position he held throughout the remainder of his life. The success of this bureau is largely due to his untiring industry and its existence and usefulness may be looked upon as the result of his life's work. One of his friends, F. M. Griswold, chief inspector of the Home Insurance Company of New York, writes:

"He certainly was a remarkably able and efficient man in the profession of fire protection engineering; of wide and well digested experience, marvelous tenacity of purpose, and successful beyond usual capacity in accomplishment."

Many letters containing similar tributes to his perfect mastery of the technique of his profession as well as to his great ability to win friends and impress his sane views on his hearers, have been received by his associates. Above all other characteristics of the man, stood his absolute and unequivocal integrity. This alone, not to speak of his fidelity, patience and sincerity, all of which qualities he possessed in a marked degree, brought him the respect and consideration of all men who dealt with him, and made his influence a potent force in this city. His life, with its humble beginning, and his steady progress in the estimation of his fellows, stands for the best that is in our minds when we speak of the typical American. By his death, the Engineers' Club has lost a valued member, and those of us who knew him well mourn the loss of a faithful friend.

Novel Rogues' Gallery

DRIVERS of vehicles in Belleville, Ill., had better have a care or their pictures will find places in a "rogues' gallery" that is to be established by the Belleville Safety First Society. Dr. Heber Robarts, president of the society, said that in the future he will send out a photographer to take photographs of violators of traffic and "Safety First" rules. No respect will be had for age, sex or station and some of the prominent citizens who park their autos on the wrong side of the street or turn corners improperly may find their likenesses posted as an example of "bone-headedness."

The society may even go so far as to have cuts made for use in the newspapers.

Dangers In Use of Gasoline

THE Department of Public Safety, Syracuse, is seeking to impress on the citizens their obligation to obey the fire prevention ordinances. Referring to the use of gasoline the department has published a warning:

With the increasing use of gasoline and other liquid fuels that are dangerous, because of their ready inflammability, there is each year an increasing number of fires and accidents which cause loss of life and great damage to property. The department would, therefore, offer a few directions.

Insist on a proper installation, inspection and test of any gasoline lighting system. Avoid improperly made joints and poor or cheap valves.

Do not clean silks with gasoline at home; the violent rubbing of the silk generates static electricity which produces a spark that ignites the vapor.

Do not use gasoline in an open vessel, either at home, cleaning establishment, or in tailor or repair shop, when smoking or with an open flame. A dangerous practice common with many people is to use gasoline in a room or place with no ventilation.

Prohibit any open flame near any apparatus being filled with gasoline. This use of gasoline produces a dangerous atmosphere that may completely surround you, so that a chance ignition will envelope you in flames and perhaps cost you your life.

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Post signs that mean real business, prohibiting open flame, or smoking near the place of storage or pumps of gasoline storage.

Druggists and other places of business: Do not sell or handle gasoline, except in the day time; then only in small quantities.

A dangerous practice, yet common in many garages, is the cleaning of automobile parts with gasoline from an open receptacle or dish and using a brush.

"Safety First" Warden Plan

THE New Jersey Safety First Federation presents the "Chief 'Safety First' Warden Plan." One person, it says, should be made responsible to supervise and stimulate others for "Safety First" measures, such as accident prevention and fire prevention, cleanliness, preservation of life, health and property, and for betterments generally:

A Chief Safety First Warden is the person selected to be in charge of a home, school, public place and industry, to institute and encourage the observation of "Safety First" measures.

This warden is to be held personally responsible for the introduction and practical operation of "Safety First" measures at all times, inside and outside and about the premises in question.

The objects of the appointment are to centralize the responsibility and stimulate action for "Safety First" measures, such as accident and fire prevention, cleanliness and the preservation of life, limb, health and property, and for betterments generally about and around everywhere.

All other persons in the various premises are to co-operate advisedly and act as assistant wardens.

Occasional official "Safety First" inspections will be made of premises and surroundings at unstated intervals, generally by uniformed members of the department of public safety, division of police and the local bureau of fire prevention, combustibles and fire risks, and specially by the State department of labor in the industries, the tenement house supervision in the homes and the division of fire in public places which includes the schools, theaters, moving picture places, business premises, etc., or the health department in all places, inclusive of public conveyances and the bureau of street traffic, and the automobile department in the highways.

The method of a centralization of responsibility with occasional official inspections as follow-ups, with earnest co-operation by all, will greatly aid in the objectives and be a source of practical benefit and value to the people and business interests and tend to improve working and living conditions generally.

Beware of Fire on Windy Days

THE following circular has been sent out by State Fire Marshal, S. W. Inglish of Texas. The letter says:

Mayors, Fire Chiefs and Fire Marshals:

A loose fire brand, a high wind and buildings covered with wood shingles are the three principal elements of a conflagration. The combination of these three elements has caused thirteen conflagrations in the United States within the past fifteen years, entailing a property loss of more than $60,000,000. Three of these conflagrations occurred in the month of March, 1916, the most destructive of which was at Paris in our own State. The property loss at Paris approximated at least $10,000,000, and in hundreds of cases wiped out the savings of a life time.

Buildings with wood shingle roofs we have. High winds we are subject to periodically and can not prevent; so it is against the loose fire brand that we must direct our preventive efforts. The season of the year is now here when a general cleanup is the order of the day. A general cleanup is a good thing since good housekeeping, individually and collectively, is one of the worst enemies to fire waste, yet we must not get careless in the use of the renovating agency—fire, else with our trash and rubbish we may also destroy our home and our business.

This communication is to give warning about open fires on windy days. Wait for a still day to burn your dead grass and the winter's accumulation of rubbish, and, in no event, start open fires near buildings. Even a fire under the wash kettle in the yard on a windy day may destroy your town. When you are about to start an open fire on a windy day—

THINK OF THE DANGER OF A CONFLAGRATION AND BEWARE!

New Fire Prevention Reel

THE Essanay Company has completed the moving picture films it recently took for the Underwriters Laboratories, following a scenario prepared by J. E. Latta, who is the Laboratories' lecturer. The title is "An Unbeliever Convinced." The story is of a factory owner who did not believe in fire prevention nor fire protection, and of his conversion when his daughter, a social settlement worker, was killed in a factory fire, due to carelessness. There is plenty of human interest, in addition to features showing the fire hazards, fire department runs and thrilling rescues. The intention is to furnish the reel for use at fire prevention meetings.

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6,050 Killed by Fire

FROM the latest mortality statistics available, that is the number of persons who suffered death during a single year as a result of conflagrations or of burns otherwise inflicted within the registration area of the United States. The death rate from these causes was rather below the average in the year quoted, the National Fire Protection Association says. Taking the figures for the registration area as a basis for estimating the total loss of life throughout the country, one will get a death roll of 9,000. Many of the deaths are the result of burns caused by the careless handling of gasoline and other hazardous liquids.

Buffalo Local Council Organized

THE membership of the National Safety Council in Buffalo has always been an indication of the city's interest in the conservation of human life, and of the progress of accident prevention in the United States. There are over 200 lines of manufacturing in Buffalo, and 2,500 industrial plants in Erie county. Fourteen of these plants have 500 or more employes, and the total number of employes runs far into the thousands. C. W. Price, field secretary of the council, recently spent two weeks in the Buffalo district, during which time meetings of managers and executives were held; round table meetings of foremen and superintendents, and the following officers were elected:

President, J. A. Gould, The Larkin Co.; first vice-president, David Bell, Buffalo Foundry & Machine Company.; second vice-president, G. E. Morgan, Otis Elevator Company; third vice-president, A. C. Weber, New York Central Lines.; treasurer, C. J. Lewis, Barcalo Manufacturing Company; secretary, E. M. Courtney, New York Telephone Company; assistant secretary, N. H. Schieb, New York Central Lines.

Committees: Membership, F. M. Harp, chairman, Employers Mutual Insurance Company; public safety, J. M. Ward, chairman, D. L. & W. R. R. Company; publicity, H. W. Allen, chairman, Buffalo Copper & Brass Rolling Mills; program, C. P. Cullen, chairman, Gould Coupler Company.

Mr. Price writes as follows:

"I had the pleasure of meeting Messrs. Harp, Gould and Allen, all enthusiastic safety men, and they rendered valuable service in my efforts to co-ordinate the work here. Mr. Mark Daily and Messrs. Conger and Case of Niagara Falls, and many other friends of the movement are just as enthusiastic in their home towns as they were at the Congress.

"We had a meeting of 50 plant managers a few days ago, so you will see that the movement is in safe hands in Buffalo and vicinity. A foremen's meeting drew an attendance of 300.

"I find an interesting situation here. In several of the cities I have visited the manufacturers seem content to let the public service corporations work out their own salvation in the matter of street accidents and public safety. Here the industrial interests take the broad view that any matter which touches on the welfare of all the people is not to be slighted and the movement is to co-operate in matters of public welfare. Street accidents are receiving much attention and carelessness and thoughtlessness on the part of automobilists receives prompt condemnation. The street car corporation is conducting a vigorous safety campaign.

"'Jay walkers' are warned to use street intersections and obey traffic rules.

"Safety work in the schools is also well under way and good results are shown. I am pleased with my visit here and more than satisfied with the splendid co-operation rendered in popularizing the safety work of the council.

Vehicle Accidents in Massachusetts

IN Massachusetts, where accident records are kept carefully, one person was killed or injured in 1915 for every 18 vehicles registered. If the 25,000 foreign cars visiting the State are included in the computation, it shows one person injured or killed for

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every 22 motor vehicles. The gravity of such an accident record cannot be denied, yet even such figures are relative and should be compared with the accident record of street cars, which run on tracks and require less skill for safe operation. These cars had a record during the same year of one person killed for every car.

The comparison has been stated in another way by the Massachusetts Highway Commission: The average motor vehicle traveled 100,000 miles before any person was killed or injured, while the average electric car traveled only 16,000 miles. So far as the danger to non-passengers is concerned, the records show that the electric car was five and one-half times more subject to such accidents than the motor vehicle.

Safety at Goodyear Plant

ALTHOUGH the number of employes of the Goodyear Tire & Rubber Company, Akron, O., is constantly increasing with the steady advance of the company's business, the number of accidents is steadily decreasing. With 14,000 workmen on the payroll at present, fewer accidents are happening than when the company employed less than 2,000 men, due to the efficient application of "Safety First" principles.

Ten Seconds for Safety

THE Grand Trunk Railway's safety department figures that a pause of 10 seconds before crossing a railroad track will insure comparative safety. A bulletin by the company says:

Is it worth 10 seconds of your time to keep from being injured or killed?

Thousands of people every year are crippled or killed because they fail to place a value of 10 seconds upon their safety.

Men were recently assigned to watch and report the conduct of people approaching and passing over tracks at important highways. Of 17,000 drivers of motor or other vehicles, 3,300 ran at reckless speed and 11,815 didn't care enough for their own lives and the lives of those in their charge to look in either direction to see if a train were approaching.

It's this disregard of common sense precautions that is bringing sorrow and suffering to so many homes.

Medals for Safety Work

ARTHUR WILLIAMS, president of the American Museum of Safety, announced on March 16 the winners of four of the five gold medals awarded annually to firms or corporations that have done most to forward industrial safety. The E. H. Harriman memorial medal, which is given to the railroad that has the best year's record, is to be awarded later.

The Anthony N. Brady medal for the American electric railway which has done most to conserve the health and safety of its employes and patrons, was assigned to the Connecticut Electric Railway of New Haven. This company operates its road through more than a dozen cities, including Bridgeport, Waterbury, and Hartford, where traffic has been complicated by the influx of munition workers.

For a device which will greatly reduce the chances of coaches telescoping, the *Scientific American* medal was given to the Pullman Company. The Louis Livingston Seaman medal for progress in the promotion of hygiene and mitigation of occupational diseases, goes to the Julius King Optical Company, New York. The Travelers Insurance Company's medal for protecting the lives of workers is bestowed upon the Commonwealth Steel Company of St. Louis.

Employes' Service Work

THE subject of employes' service work and industrial education, as developed in Cincinnati, will be discussed at the spring meeting of the American Association of Mechanical Engineers at Cincinnati, May 21-24. A joint session will be held at that time with the National Machine Tool Builders' Association.

Special sessions of sub-committees will discuss gas power and machine shop practice. At the gas power session papers will be presented on recent developments in high-speed gasoline engines with special reference to automobile and aviation service. The machine shop ses-

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sion will be of particular interest to all engaged in the manufacture or use of machine tools.

Ohio State Safety Exhibit

THE third annual Ohio State Safety Exhibit, Columbus, Ohio, March 6 to 10, was by far the best ever conducted. Memorial Hall, where the exhibit was held, was beautifully decorated and the exhibits were artistically arranged. Fine exhibits were made by the Ohio Industrial Commission, United States Steel Corporation, American Rolling Mill, Baltimore & Ohio R. R., Norfolk & Western R. R., Ralston Steel Car Company, Republic Iron & Steel Company and many others.

A miniature playground, shown by the Carnegie Steel Company for the first time since it was exhibited at the Panama-Pacific Exposition, created a great deal of interest, while several models of the plant and grounds of the American Rolling Mill were always surrounded by interested spectators. The commercial exhibits were varied and well gotten up, many new safety devices being shown. Addresses of welcome and safety talks were given by Governor Cox, Safety Director Victor T. Noonan, Mayor Karb and officials of the Industrial Commission. The attendance was good, safety men and manufacturers from all over the State, and from other States, being present.

Survey of School Zones in Chicago

THE Public Safety Commission of Chicago and Cook county, following many reports of various dangerous conditions existing in the neighborhood of schools in Chicago, recently appointed two intelligent officers to investigate the environs of every public school in the city. The officers' report shows that there are 198 public schools within the city limits without any guard of police or "slow-down" signs within the surrounding streets, though many of the schools are in localities where the population is congested and the school attendance very large. This means that only one-third of the city school zones are protected by either officers or caution signs. This lack of care also explains the prevalence of accidents, which sometimes cripple children for life, and not infrequently result in death. For the year ended December, 1915, the coroner of Cook county recorded 135 deaths by automobiles, 81 of which were children under 16. Deaths by street cars during the same period numbered 139, but it is not recorded how many of them were children. The Chicago police report for 1915 showed 2,221 street car accidents and 2,589 automobile accidents, but of these there is no record as to how many were children.

The commission says: "Certain remedies for these conditions of danger are urgently called for. The appeals made to the commission for warning signs have often been pathetic and persistent. In a few instances we have supplied them, but the commission has not been furnished with funds to enable it to establish a regular system of warning signs throughout the city."

N. F. P. A. Convention in May

THE National Fire Protection Association will hold its 1917 Convention at Washington, D. C., with headquarters at the New Willard Hotel, May 8, 9 and 10. As these lines are written the program is not yet announced. One day will be spent at the Bureau of Standards witnessing tests, etc. Luncheon will be served at the bureau and Dr. Stratton, a director, is to deliver an address. Heretofore the conventions of the National Fire Protection Association have been held alternately in New York and Chicago.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection amounts to little in numerous cases.

BREWERIES AND MALT HOUSES

January 26, 1917. Boston, Mass. Boylston Brewery Company. Bismarck and Germania streets. Brewing and bottling beer. Portion of 2-story bottling department destroyed. Walls, brick with wood partitions. Floors, wood. Cause, unknown. Fire started at door of shipping office. Discovered by a boy about 5:50 p. m. Alarm, street box. Duration, 2½ hours. Stopped after burning about two-thirds of floor area and roof. Fire was favored by wood construction and inflammable contents. Private fire apparatus, 2 lines of 2-inch hose from brewery 100 feet distant. Persons in building, none. Injured, district fire chief injured by engine stream. Means of escape, not reported. Value of building and contents, $125,000. Property loss, estimated at $50,000.

CHEMICAL AND PHARMACEUTICAL WORKS

January 25, 1917. Toronto, Ont. Channel Chemical Company. 369 Souaren avenue. Manufacturing "O'Cedar" dustless mops and furniture polishes. One 3-story building damaged. Walls, brick. Floors, wood. Roofs, wood, tar and gravel. Cause, supposedly spontaneous combustion. Fire started in basement near boiler. Discovered by watchman in neighboring building about 7:57 p. m. Alarm, telephone and street box. Duration, 3½ hours. Stopped in 2nd story. Fire was favored. No fire walls. Firemen handicapped by wire glass windows in building. Persons in building, none. Means of escape, enclosed stairways to doors and outside fire escapes. Value of building and contents, $55,000. Property loss, $23,000.

CHURCHES

January 12, 1917. Philadelphia, Pa. Walnut Street Presbyterian Church. 3927 Walnut street. One 2½-story building partially destroyed. Walls, stone. Floors, wood. Roofs, slate. Cause, unknown. Fire started in schoolroom in 2nd story about 12:19 a. m. Alarm, fire alarm telephone and telegraph. Duration, about 6½ hours. Stopped at roof and partitions. Fire was favored by large open space, wood partitions and furniture, and loft over the organ. Firemen handicapped by peculiar constructive conditions. Persons in building, none. Means of escape, inside stairways. Property loss, not reported to SAFETY ENGINEERING.

January 12, 1917. Roanoke, Va. Belmont Methodist Church. Jameson avenue and 8th street, S. E. One 1- and 1½-story building destroyed. Walls, brick. Floors, wood. Roofs, slate. Cause, unknown. Discovered by passerby about 12:50 a. m. Alarm, street box. Duration, comparatively short time. Stopped in same building. Fire was favored by adjoining buildings on north and east which caused walls to retain the heat. Persons in building, none. Means of escape, usual exits. Value of building and contents, $33,000. Property loss, about 80 per cent of total value.

January 25, 1917. Carterville, Ill. Immaculate Conception Roman Catholic Church. One 1-story building damaged. Walls, wood. Floors, wood. Roofs, shingle. Cause, unknown, probably incendiary. Fire started in rear of building. Discovered by passerby about 12:01 a. m. Alarm, telephone. Duration, 1 hour. Stopped in the church. Fire was favored by dry wood construction. Firemen handicapped by lack of water. Persons in building, none. Means of escape, 1-story building. Value of building and contents, $2,500. Property loss, $500.

CLOTHING FACTORIES

January 29, 1917. Salisbury, Md. Jackson, Gutman & Lane Company. Newton street. Manufacturing shirts. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, metal. Cause, unknown. Fire started in stitching room. Discovered by night watchman about 8:45 p. m. Alarm, telephone. Duration, 10 hours. Stopped at boiler and engine room. Firemen handicapped by dense fog and smoke. Private fire apparatus, two elevated water-tanks. Persons in building, none. Means of escape, fire escapes. Value of building and contents, approximately $250,000. Property loss, total.

DEPARTMENT STORES

January 20, 1917. Manitowoc, Wis. Torrison department store. Commercial and 8th streets. Department store. One 3-story building damaged. Walls, brick. Floors, cement in basement, others wood. Roofs, gravel. Cause, unknown. Fire started in basement among stock of woolen yarns and underwear.

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A disastrous fire on January 29, in Hartford, Conn., destroyed 4 connecting buildings, 3 to 5 stories high. The fire started in the department store of G. Fox & Co., cause unknown, and spread rapidly to the adjoining buildings, favored by inflammable construction and contents of the stores. The fire was discovered at 11:15 p. m. Four watchmen were the sole occupants of the property. During business hours 1,300 persons were employed by the various concerns. The total loss was about $750,000.

Discovered by employes about 1:15 p. m. Alarm, telephone. Duration, about 1½ hours. Stopped near place of origin. Fire was retarded by cement floor and steel ceiling. Private fire apparatus, several 5-gallon hand extinguishers. Persons in building, 20. Injured, 1 fireman overcome by smoke. Means of escape, fire escape on north side of building. Value of building and contents, $205,000. Property loss, about $17,850.

January 29, 1917. Hartford, Conn. G. Fox & Co. and others. 956-986 Main street. Department store, Woolworth 5- and 10-cent store, etc. Four connecting buildings, 3 to 5 stories high, destroyed. Walls, brick. Floors, wood. Roofs, wood and metal. Cause, unknown. Fire started on ground floor. Discovered by watchman about 11:15 p. m. Alarm, box. Duration, 18 hours. Fire was favored by inflammable construction and contents of buildings. Firemen handicapped by rapid progress of fire. Persons in building, 4 watchmen; 1,300 employes in business hours. Means of escape, fire escapes. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $750,000.

DWELLINGS, ORDINARY CITY

February 5, 1917. Philadelphia, Pa. Max Pomerantz. Fifth and Green streets. Photograph gallery and dwelling. One 3-story building damaged. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in 1st story hallway. Discovered by passerby about 1:30 a. m. Alarm, telephone and box alarm. Duration, 25 minutes. Stopped at 2nd story. Persons in building, 5. Killed, 5. Means of escape, none.

ELECTRIC LIGHT AND POWER STATIONS

January 23, 1917. Gatesville, Tex. Gatesville Electric Light & Power Company. Tenth street. Electric light and power plant. One 2-story building destroyed. Walls, frame, iron

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clad. Floors, wood. Roofs, metal. Cause, unknown. Fire started with gas explosion in the building. Discovered by engineer in charge of plant about 6 p. m. Alarm, telephone. Duration, about 3 hours. Stopped at building where it started. Firemen handicapped by insufficient water pressure. Private fire apparatus, line of ¾-inch hose. Persons in building, one. Means of escape, through window. Value of building and contents, $6,500. Property loss, $6,500 to $7,000.

CONFLAGRATIONS

January 25, 1917. Sparta, Mo. Several business buildings. Main street. General store, grocery, barber shop, blacksmith shop, produce dealer, postoffice, dwelling, etc. Two 2-story and eight 1-story buildings destroyed. Walls, frame. Floors, wood. Roofs, shingle. Cause, unknown. Fire started in rear of either general store or grocery. Discovered by light from flames about midnight; no fire department. Duration, 1½ hours. Fire was favored by flimsy wood construction. Private fire apparatus, buckets; engine and hose belonging to neighboring furniture store. Persons in building, none. Means of escape, mostly 1-story buildings. Value of buildings and contents, $40,000. Property loss, $36,000.

FLATS AND TENEMENTS

February 2, 1917. Chicago, Ill. Tenement buildings. 813-823 W. 14th Place. Five 3-story buildings destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, explosion of gas. Discovered by policeman about 12:56 a. m. Alarm, from Maxwell street police station to fire department. Duration, about 10 hours. Stopped when buildings were consumed. Fire was favored by lath and wood joists and combustible contents. Persons in building, about 60. Killed, 14. Injured, 12. Means of escape, ordinary wooden stairways. Value of buildings and contents, $42,000. Property loss, $40,000. When the department arrived at this fire, 4 buildings had fallen in a heap, one only was standing. The fire was blazing fiercely through the debris, while gas was burning around the front sidewalks and in the street. Janitor of the buildings claims there had been a leak in the gas pipes. He notified the gas company which had sent a man the previous day who had supposedly

Photo by Social Press Association, N. Y.

The Brown & Thompson department store, Hartford, Conn., was exposed in the rear to the conflagration starting in the store of G. Fox & Co., on January 29. The wire glass window shown above resisted the fire, and the Brown & Thompson building and stock escaped with only a trifling loss.

The windows on the first floor of the Brown & Thompson annex were wire glass which kept the fire from the Fox building from coming in on that floor although only a few feet away. The windows in all of the rest of the Brown & Thompson building were of plain glass and were all burned out completely, making it necessary to use large hose streams in that building to keep the fire out, and causing large water damage, which wonld have been unnecessary if the windows had been equipped with wire glass. The wire glass windows in the Annex building of Brown & Thompson were all cracked from the intense heat but the fire did not get by them.

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mended matters. The force of the explosion broke many windows in an area four blocks square, rocked buildings and caused brick chimneys to fall. The fire scorched adjoining frame buildings and burning brands ignited buildings a block away.

FLOUR AND CEREAL MILLS

January 25, 1917. East St. Louis, Ill. Golden Grain Milling Company. St. Louis avenue and 20th street. Manufacturing stock feed. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Discovered by passersby about 11:25 p. m. Alarm, Gamewell system. Duration, 7 hours. Stopped when building was consumed. Fire was favored by absence of fire walls. Persons in building, 23. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $45,000. Property loss, total.

FOUNDRIES AND MACHINE SHOPS

January 19, 1917. Oakland, Cal. Jensen Machinery Company. Second and Oak streets. Manufacturer of creamery machinery, tanks, etc. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, shingle. Cause, unknown. Fire started near center of building about 9:10 p. m. Alarm, telephone and street box. Duration, 2 hours. Fire was confined to one building. Fire was favored by cheap wood construction and no partitions. Persons in building, none. Means of escape, ordinary doors. Value of building and contents, $50,000.

January 21, 1917. Amherst, N. S. International Engineering Iron Works. LaPlanche street. Engines, boilers, munitions, etc. One building damaged, 50 feet high, with riveting tower 60 feet higher. Walls, wood. Floors, wood. Roofs, wood. Cause, supposed to have ignited from sparks. Fire started in chipping room at west end. Discovered by employe about 9:45 a. m. Alarm, street box. Duration, under control in 2 hours. Stopped in riveting tower. Fire was favored by wood construction. Firemen handicapped by frozen hydrant. Private fire apparatus, 2 hydrants with hose attached. Persons in building, none; fire occurred on Sunday. Value of building and contents, $70,000. Property loss, $23,000.

GENERAL STORES

January 31, 1917. Ashley, Pa. C. Tremayne. South Main street. General store. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood, metal ceilings. Cause, unknown. Fire started near front of basement. Discovered by baker; lights went out in adjoining bakeshop about 4:10 a. m. Alarm, passersby and fire gong. Duration, 12 hours. Fire confined within walls of building. Firemen handicapped by insufficient water pressure. Private fire apparatus, assistance from Wilkes-Barre. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $85,000. Property loss, $12,000.

GRAIN ELEVATORS

January 27, 1917. Parker, S. D. Peter Meir. Main street. Grain elevator. One 3-story building destroyed. Walls, wood sheathed with iron. Floors, hopper bottom matched wood floor. Roofs, wood sheathed with iron. Cause, unknown. Five different fires occurring in rapid succession in various places. Discovered by man in nearby garage about 4 p. m., first fire; last one at midnight. Alarm, fire bell. Duration, last fire, 1 hour and 40 minutes. Stopped in building where first discovered. Fire was favored by iron-clad construction. Persons in building, none. Value of building and contents, $6,000. Property loss, total.

HOTELS AND LODGING HOUSES

January 31, 1917. Cannelton, Ind. Sunlight Hotel and others. First and Washington streets. Hotel and saloon. Four 2- and 3-story buildings destroyed; two others damaged. Walls, stone, brick and wood. Floors, wood. Roofs, metal. Cause, unknown. Fire started in 1st story of hotel. Discovered by appearance of smoke about 1:30 a. m. Alarm, bells and whistle. Duration, 4 hours. Firemen handicapped by high wind. Persons in building, 14. Killed, 1. Injured, 1. Means of escape, windows and fire escape. Value of buildings and contents, $42,500.

February 10, 1917. South Bethlehem, Pa. Greek boarding house. Butterwood and Centre streets. Boarding house and grocery store. One 2½-story building partially destroyed. Walls, wood. Floors, wood. Roofs, slate. Cause, probably overheated stove and chimney. Fire started in the kitchen in rear of store. Discovered by passerby about 4:45 a. m. Alarm, from two street boxes. Duration, about 2 hours. Stopped in front part of the building. Fire was favored by flimsy construction and high wind. Firemen handicapped by extreme cold. Private fire apparatus, combination hose automobile truck belonging to Bethlehem Steel Company. Persons in building, about 10. Killed, 4. Means of escape, jumping from windows. Value of building and contents, approximately $5,000. Property loss, $2,000.

LAUNDRIES

February 3, 1917. Amarillo, Tex. Panhandle Steam Laundry. 201 Pine street. One 2-story building destroyed. Walls, cement blocks. Floors, wood. Roofs, wood, tar and gravel. Cause, unknown. Fire started near center of the building. Discovered by man four blocks away who saw flames coming through roof about 2:50 a. m. Alarm, telephone. Duration, 3 hours. Stopped at building where it started. Fire was favored by wood interior with frame clothes racks. Firemen handicapped by concrete block walls which were too flimsy to work under. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $15,000. Property loss, $8,500.

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Photo by Social Press Association, N. Y.

Ruins of the Royal (Brewster) Cocoa Company's plant, Jersey City, N. J., after the fires of February 5 and 6. The first fire, which was discovered about 8 p. m., February 5, was under control in 2 hours; the 2nd fire, discovered the next morning, soon after 4 o'clock, burned for 2 days or more. The plant was fully equipped with automatic sprinklers. The department was handicapped by insufficient water pressure, and the fire spread to adjoining factory buildings, damaging them slightly. The fire was supposedly of incendiary origin.

MANUFACTORIES, MISCELLANEOUS

February 5, 1917. Jersey City, N. J. Brewster Cocoa Company. (Royal Cocoa Company.) 999 Westside avenue, occupied one block. Manufacturer of chocolate and cocoa. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, metal. Cause, supposedly incendiary. Fire started in first story. Discovered by police officer about 8:02 p. m., first fire; second fire, 4:18 a. m., February 6. Alarm, regular system. Duration, first fire, 2 hours; 2nd fire, 2 days or more. Stopped when building was consumed. Fire extended to 980, 982, 992 Westside avenue, damaging buildings slightly. Fire was favored by wood construction. Firemen handicapped by poor water pressure. Private fire apparatus, sprinkler system. Persons in building, engineer and watchman only. Injured, 3 firemen; removed to hospital. Means of escape, fire escapes. Carried insurance of $493,000. Property loss, total.

It is stated that the sprinklers worked at the first fire, extinguishing the flames. Afterwards the water in the sprinkler system was turned off. When the second fire started the sprinkler system was useless owing to the lack of water.

MERCANTILES, MISCELLANEOUS

January 10, 1917. Quebec, Que. Turcotte & Co. St. Paul and Dalhousie streets. Wine shops and others. Three 4-story buildings partially destroyed. Walls, brick and stone. Floors, wood. Roofs, wood, covered with metal. Cause, overheated stove. Fire started in 2nd flat. Discovered by passing workman about 7:06 a. m. Alarm, signal box. Duration, 11 hours. Stopped near place of origin. Firemen handicapped by electric wires. Persons in building, 20. Means of escape, none. Value of buildings and contents, $125,000. Property loss, $23,600.

January 11, 1917. Kenosha, Wis. A. Trakshilas and others. 162-64 Milwaukee street. Men's furnishing, etc. Two 1- and 2-story buildings destroyed. Walls, wood. Floors,

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Photo by Fankins, Lynn, Mass.

Room 221 in 3rd story of the Hotel Lenox, Boston, Mass., where a fire originated on February 10. Cause, unknown. The occupant of the room left the door open, as he dashed out to give the alarm, which allowed the flames to spread throughout the 11-story building to the roof. The fire started at 5 a. m., and members of the fire department carried out of the building more than 50 of the 200 guests who were asleep in the hotel. The property loss amounts to about $75,000, while the loss on personal property of the guests adds materially to this figure. The occupant of the room where fire started, and two other guests were painfully, though not seriously burned in making their escape.

wood. Roofs, gravel and tar. Cause, overheated stove. Fire started in men's furnishing store. Discovered by next door neighbors about 9:45 p. m. Alarm, telephone. Duration, 2 hours. Stopped at adjoining building. Fire was favored by frame construction. Persons in building, 15. Means of escape, front and rear stairways. Value of buildings and contents, $9,000. Property loss, not reported to SAFETY ENGINEERING.

January 12, 1917. Tishomingo, Miss. Several business buildings. Main street. General store, barber shop, postoffice, drug, feed and hardware stores, restaurant. Eight 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, six metal and two shingle roofs. Cause, unknown. Discovered by neighbor about 1 a. m. No fire department. Duration, 1 hour, 15 minutes. Stopped when entire block was consumed. Fire was favored by close proximity of buildings. Private fire apparatus, none. Persons in building, none. Means of escape, none; all 1-story buildings. Value of buildings and contents, $30,000. Property loss, total.

January 21, 1917. Waterbury, Conn. Fulton, Driggs & Smith. 158 Grand street. Dealers in musical instruments. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, wood, tar and gravel. Cause, spontaneous combustion. Fire started in basement. Discovered by policeman who smelled smoke about 10:48 p. m. Alarm, verbal followed by bell. Duration, 6 hours, confined to building. Fire was favored by open stairway and elevator open on one side from basement to roof. Persons in building, none. Means of escape, front entrance and fire escape in rear. Value of building and contents, $70,000. Property loss, $57,000.

January 22, 1917. Paradise, Pa. Lancaster Seed Co. Dealers in seeds. Three 1-, 2- and 3-story buildings destroyed. Walls, wood. Floors, wood. Roofs, sheet metal. Cause, unknown. Fire started under floor of print shop. Discovered by citizen returning from village about 8:30 p. m. Alarm, telephone and fire gong. Duration, 2½ hours. Stopped when buildings were destroyed. Persons in building, 1. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $65,000. Property loss, $45,000.

January 29, 1917. Logansport, Ind. H. Wiler & Co. Broadway and 4th street. Wholesale and retail furniture and carpets. One 3- and 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, undetermined. Fire started in 3rd story. Discovered by neighbors who saw flames through windows about 12:10 p. m. Alarm, street box. Duration, 3½ hours. Stopped midway in building; burned in rear.

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Central News Photo Service, N. Y.

Firemen pumping water on the burning building of the Field Cloak & Suit Company, Detroit, Mich. Five firemen were killed and 3 others injured in this fire on March 4. The loss amounted to about $350,000.

Fire was favored by winding inside stairway leading to 4th story. Firemen handicapped by shortage of men; half of force had gone to dinner. Persons in building, 10. Injured, 2 firemen slightly hurt by falling glass. Means of escape, inadequate.

Value of building and contents, $100,000. Property loss, $35,000.

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January 30, 1917. Muskegon, Mich. Business building. 21-27 S. Terrace street. Grocery and furniture stores in 1st story; hotel and rooming house in 2nd and 3rd stories. One 3-story building destroyed. Walls, brick veneer. Floors, wood. Roofs, tar and gravel. Cause, defective chimney. Fire started at roof. Discovered by passersby about 3:05 a.m. Alarm, telephone. Duration, 6 hours. Stopped in 2nd story. Persons in building, 40. Injured, 2. Means of escape, front and back stairways; fire escape in rear. Value of building and contents, $31,000.

February 3, 1917. Covington, Va. Several buildings. 317-327 W. Main street. Hardware, jewelry and department stores, bowling alley and dwelling. Four 2-story and two 3-story buildings destroyed. Walls, wood. Floors, wood. Roofs, tin. Cause, overheated stove in bowling alley. Fire started in bowling alley, 321 W. Main street. Discovered by smoke coming out of cornice about 10 a. m. Alarm by messenger. Duration, 6 hours. Stopped at 329 W. Main street. Fire was favored by proximity of buildings. Private fire apparatus, line of hose in one building with fire main inside of building. Persons in buildings, 28. Means of escape, usual exits. Value of buildings and contents, $40,000. Property loss, $10,000.

February 10, 1917. Port Chester, N. Y. Two business buildings. Main street. Dry goods store, barber shop, wine store, tailor, insurance and men's clothing. One 2-story and one 3-story building destroyed. Walls, wood and brick. Floors, wood. Roofs, wood, covered with shingles and metal. Cause, overheated stove. Fire started in 2nd story beams of wooden building. Discovered by passersby about 9:15 p. m. Alarm, regular system. Duration, 4 hours. Stopped in 3rd story of brick building next door to place of origin. Fire was favored by old and dry wood construction; 60-mile gale blowing at the time of fire. Firemen handicapped by extreme cold, high wind and coating of ice. Persons in building, 6. Means of escape, inside wooden stairways. Value of buildings and contents, $100,000. Property loss, $7,000 on buildings.

MERCANTILES, TENANT BUILDINGS

January 11, 1917. Rochester, Minn. Horton block. Broadway and Zumbro street. Bank: jewelry, dry goods and clothing stores, etc. Two 2- and 3-story buildings destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, spontaneous combustion. Fire started in rear of furniture store about 9:45 (?). Alarm, street box. Duration, 8 hours. Stopped in grocery store. Fire was favored by wood floors and partitions and elevator shaft. Persons in building, 3. Means of escape, fire escape. Value of buildings, $72,000. Property loss, $240,000.

January 14, 1917. Berkeley Springs, W. Va. *Post* Printing Co. and others. Washington and Congress streets. Printing office, two plumbing shops, stores, meat market and office. One 2-story building destroyed, dwelling damaged. Walls, wood. Floors, wood. Roofs, corrugated iron. Cause, unknown. Fire started near center of building. Discovered by passerby about 3 a. m. Alarm, by whistle. Duration, between 2 and 3 hours. Stopped at building where it originated. Fire was retarded by cold weather. Persons in building, none at time of fire. Means of escape, ample doorways. Value of buildings and contents, $18,000 to $20,000. Property loss, $15,000.

January 24, 1917. Fessenden, N. D. A. E. Speiser building. Stores, pool hall, offices and dwelling. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, composition. Cause, defective furnace. Fire started in furnace room. Discovered by occupants sleeping in 2nd story about 2:30 a. m. Alarm, telephone and bell alarm. Duration, 4 hours. Stopped at adjoining building. Fire was retarded by substantial walls. Firemen handicapped by extreme cold; blizzard raging; gale of 60 to 70 miles per hour. Persons in building, 5. Injured, 1. Means of escape, outside stairway and ladder. Value of building and contents, $10,000. Property loss, $4,000.

January 24, 1917. Reading, Pa. Academy building. 533-35 Penn street. Stores, restaurant, etc. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in 2nd story. Discovered by occupant about 3:25 a. m. Alarm, bell. Duration, 7 hours. Stopped in building. Persons in building, about 25. Means of escape, fire escape. Value of building and contents, $170,000. Property loss, $100,000.

January 26, 1917. Petaluma, Cal. Masonic Temple building. Main and Western avenue. Millinery, clothing and grocery stores. Part of one 3-story building destroyed. Walls, brick. Floors, wood. Roofs, tin and gravel. Cause, supposedly a defective stove. Fire started apparently in rear of millinery store. Discovered by man sleeping in the building about 5 a. m. Alarm, Gamewell system. Duration, 4 hours. Stopped in same building. Fire was favored by "light well" through building, although a solid brick wall through the center of the building retarded spread of the fire. Firemen handicapped by lack of ladders. Persons in building, 1. Injured, fire chief and 2 firemen. Means of escape, stairway only. Value of building and contents, $134,000. Property loss, $26,500.

METAL WORKERS

January 27, 1917. New Bedford, Mass. Taunton-New Bedford Copper Mfg. Company. Front street. Copper works, print rolls, etc. Two 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in drying room. Discovered by watchman about 6:10 p. m. Alarm, private box on the premises. Duration, 4½ hours. Stopped at buildings where it started (connecting). Fire was favored by all wood construction; large open space with doors on street level. Private fire apparatus, 2 hose streams. Persons in building, none. Means of escape, not reported to SAFETY ENGINEER-

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Photo by Social Press Association, N. Y.

Assembly room of the Brownsville Labor Lyceum, 219-229 Sackman street, Brownsville, N. Y., after the fire on January 28. Fifteen hundred persons were in the building at the time fire was discovered about 11 a. m. on Sunday. About 600 boys and girls were attending the Socialist Sunday school in classrooms on the 2nd floor while various labor unions were holding meetings in the upper stories of the 4-story building. Three persons were painfully burned in escaping, 2 firemen were slightly injured. Delay in sending in the alarm allowed the fire to gain such headway that the building was practically destroyed. It is believed that the fire may have originated from a lighted cigarette thrown on the floor by a dancer the night before.

ING. Value of buildings and contents, $300,000. Property loss, $200,000.

MISCELLANEOUS

January 24, 1917. Irvington, N. Y. Riverside Metals Corporation. South A. street. Manufacturing time-fuses for Russian Government. One 3-story building damaged. Walls, brick covered with cement. Floors, fireproof composition. Roofs, tin and tar and gravel. Cause, spark from a dull tool supposed to have caused explosion. Fire started in 3rd story. Discovered by noise of explosion about 5:05 p. m. Alarm, fire department not notified. Stopped in room of origin. Fire was retarded by construction of building. Private fire apparatus, one standpipe and line of 2-inch hose. Persons in building, from 300 to 350. Injured, 3 persons burned. Means of escape, not reported to SAFETY ENGINEERING. Property loss, trifling.

January 26, 1917. Guthrie Center, Iowa. Guthrie Center Go-operative Creamery Co. North 1st street. Creamery. One 2-story building destroyed. Walls, wood. Floors, cement. Roofs, shingle. Cause, supposedly incendiary. Fire started in 1st story, southwest corner. Discovered by neighbors about 7:30 p. m. Alarm, telephone. Duration, 3 hours. Stopped when building was consumed. Fire was favored by frame construction. Firemen handicapped by frozen hose. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $6,000. Property loss, total.

PLACES OF ASSEMBLY

January 16, 1917. Troy, N. Y. N. Y. N. G., Second Regiment armory. Ferry and River streets. One building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started on Ferry street side. Discovered

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by passerby about 5:19 a. m. Alarm, telephone and street box. Duration, 12 hours. Stopped in same building. Fire was favored by strong draft in open drill shed and headway gained before fire was discovered. Firemen handicapped by menace of 200,000 rounds of ball cartridges; powder magazines also exploded. Private fire apparatus, standpipes with hose attached; impossible to enter building to make use of them. Persons in building, none. Means of escape, ample exits. Value of building and contents, $300,000. Property loss, total.

January 23, 1917. Olean, N. Y. State Armory. Barry and North streets. One 3-story building and drill shed destroyed. Walls, brick. Floors, wood. Roofs, slate. Cause, unknown. Fire started in administration building. Discovered by steward in adjoining building about 12:30 a. m. Alarm, street box. Duration, 10 hours. Stopped at drill shed. Persons in building, none. Injured, 2 firemen. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $100,000. Property loss, not reported.

January 28, 1917. Brooklyn, N. Y. Brownsville Labor Lyceum building. 219-229 Sackman street, Brownsville. Hall and lodge rooms. One 4-story building seriously damaged. Walls, brick. Floors, wood. Roofs, wood and tin. Cause, unknown. Fire started in coatroom in basement. Discovered by employe about 10:50 a. m. Alarm, street alarm. Duration, 1½ hours; spread throughout the building. Private fire apparatus, hose lines and extinguishers. Injured, 3 civilians and 2 firemen. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $44,500. Property loss, $22,500. The fire had extended throughout the building before arrival of the fire department. Alarm was delayed as the fire was fought for 10 minutes with house lines and extinguishers.

PRINTERS AND BOOKBINDERS

January 11, 1917. Dallas, Tex. A. Zeese Engraving Co. and one other. 1102 Commerce street. Engraving and press work, store on ground floor. One 3-story building destroyed. Walls, brick fire walls. Floors, wood. Roofs, tar-gravel and paper. Cause, unknown. Fire started in engraving room, rear of 3rd story about 11:24 p. m. Alarm, Gamewell system. Duration, 1 hour. Fire was confined to upper story. Fire was favored by poor construction; old building. Persons in building, none. Means of escape, front stairway and fire escape in rear. Value of building and contents, $90,000. Property loss, $61,000. Fire escape had been recently built to comply with the State law. It greatly assisted the fire department in getting its hose lines to the seat of the fire.

RAILROAD PROPERTY

January 12, 1917. Kingsport, Tenn. Carolina, Clinchfield & Ohio R. R. Commerce street. Freight depot. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, metal shingles. Cause, defective flue. Fire started in express room. Discovered by outside employe about 12:25 a. m. Alarm, telephone. Duration, 3 hours. Stopped in same building. Firemen handicapped by lack of sufficient water pressure. Private fire apparatus belonging to Kingsport Imp. Corporation. Persons in building, none. Means of escape, doors, 1-story building. Value of building and contents, $10,000. Property loss, more than 50 per cent.

February 3, 1917. Charleston, S. C. Atlantic Coast Line Railway. Riverfront on Cooper River. Warehouse on Northeastern wharf. One 1-story building and 2 box-cars destroyed. Walls, wood. Floors, wood. Roofs, composition. Cause, carelessness of tramps with fire. Fire started near center of the building. Discovered by yardmaster of railway about 2:28 p. m. Alarm, Gamewell system. Duration, 12 hours. Stopped at end of pier. Fire was favored by wood construction with no division walls. Firemen handicapped by peculiar situation of building in the midst of railroad tracks, built on piling on the waterfront. No engine or hose wagon could be taken to the wharf as tracks were built on trestles. Also the nearest hydrant was fully 4,500 to 5,000 feet away. Three fire-boats did valiant service. Persons in building, none. Means of escape, none. Value of building and contents, $25,000. Property loss, $22,000.

STABLES

January 12, 1917. Quebec, Que. A. Tardif. St. Valier street. Stock stables and agricultural implements. One 5-story building partially destroyed. Walls, wood and brick. Floors, wood. Roofs, tin. Cause, defective electric wires. Fire started in stables. Discovered by watchman about 9 a. m. Alarm, signal box. Duration, 14 hours. Stopped at place of origin. Persons in building, about 50. Means of escape, none. Value of building and contents, $200,000.

THEATERS AND AMUSEMENT PLACES

January 19, 1917. Savanna, Ill. Fulrath's Opera House. Main and Washington streets. Opera house and garage. Two 2-story buildings destroyed. Walls, brick. Floors, wood and cement. Roofs, tar. Cause, cigarette stub. Fire started in lobby of opera house. Discovered by passerby about 11:30 p. m. Alarm, by messenger. Duration, 5 days. Fire was retarded by brick walls and tar roof. Firemen handicapped by ice in water hydrant. Persons in building, none. Means of escape, front entrances and rear fire escape. Value of buildings and contents, $60,000. Property loss, $35,000.

February 1, 1917. Amherst, N. S. Empress Theater. Victoria street. One building, 50 feet high, destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Discovered by a citizen when flames burst through roof about 4:45 a. m. Alarm, telephone and street box. Duration, 3 hours. Fire confined

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to main building. Firemen handicapped by headway of fire before alarm was given. Persons in building, none; 3 firemen slightly injured. Means of escape, entrance and fire escapes. Value of building and contents, $34,250. Property loss, $25,000.

WAREHOUSES, PUBLIC STORES

January 5, 1917. Vancouver, B. C. Warehouse of Wood, Vallance & Leggatt, Ltd. 573 Corrall street. Wholesale hardware and sporting goods. One 4-story building partially destroyed. Walls, brick. Floors, mill constructed. Roofs, tar and gravel. Cause, unknown. Fire started in 2nd story toward the rear. Discovered by watchman about 11:06 p. m. Alarm, fire alarm telegraph on the premises. Duration, 13 hours. Stopped after burning part of roof. Fire was retarded by slow-burning construction. Firemen handicapped by dense smoke which affected the men's eyes. Persons in building, watchman only; 15 firemen slightly injured. Means of escape, fire escapes. Value of building and contents, $600,000. Property loss, approximately $300,000.

February 4, 1917. Philadelphia, Pa. Gimbel Brothers. Market and 21st streets. Furniture warehouse. Six 4-story buildings partially destroyed. Walls, brick and stone. Floors, wood and concrete. Roofs, tin and slag. Cause, unknown. Fire started, uncertain. Discovered by employe about 3:22 a. m. Alarm, fire alarm telegraph. Duration, 7½ hours. Stopped four doors from place of origin. Firemen handicapped by frozen fire hydrants. Persons in building, not known. Injured, 12. Means of escape, fire towers, 7 fire escapes.

WOODWORKERS

January 11, 1917. Lansing, Mich. Lansing Wagon Works. 504 Grand avenue, N. Manufacturing automobile bodies, wagons and buggies. Two 2-story buildings destroyed. Walls, wood and brick. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started near center of frame building on ground floor. Discovered by passerby who saw flames coming from roof about 12:04 a. m. Alarm, street box. Duration, 4 hours. Stopped at brick wall, about 10 feet distant from another frame building. Fire was favored by frame construction and highly inflammable contents of buildings. Firemen handicapped by headway of fire before alarm was given. Private fire apparatus. Persons in building, watchman. Means of escape, ordinary doors only. Value of buildings and contents, $24,000. Property loss, total.

KILLED AND INJURED IN FIRES SINCE JANUARY 1, 1917

January 2, Logansport, Ind. Park and White hotels, garage, theater, etc. Fire chief and 1 fireman injured.

January 5. Vancouver, B. C. Wood, Vallance & Leggatt, Ltd. Warehouse. Fifteen firemen slightly injured.

January 7. Melrose, Mass. Stable of R. Philpott. Two persons injured.

January 9. Troy, N. Y. Troy *Observer* building. Explosion shot flames across the street, burning and injuring about 30 persons, including firemen, policemen and spectators.

January 20. Manitowoc, Wis. Torrison department store. One fireman overcome by smoke.

January 23. Olean, N. Y. State armory. Two firemen injured.

January 24. Irvington, N. Y. Riverside Metals Corporation. Manufacturing time-fuses for Russian Government. Three persons burned.

January 24. Fessenden, N. D. A. E. Speiser building. One person injured.

January 26. Petaluma, Cal. Masonic Temple building. Fire chief and 2 firemen injured.

January 26. Boston, Mass. Boylston Brewery Co. District fire chief injured by engine stream.

January 28. Brooklyn, N. Y. Brownsville Labor Lyceum building. Three civilians and 2 firemen injured.

January 29. Logansport, Ind. H. Wiler & Co. Wholesale and retail furniture and carpets. Two firemen slightly injured by falling glass.

January 30. Muskegon, Mich. Business building. Two persons injured.

January 31. Cannelton, Ind. Sunlight hotel and other buildings. One person killed, 1 injured.

February 1. Amherst, N. S. Empress theater. Three firemen slightly injured.

February 2. Chicago, Ill. Five 3-story tenement houses. Fourteen persons killed, 12 injured.

February 4. Philadelphia, Pa. Gimbel Brothers. Furniture warehouse. Twelve persons injured.

February 5. Jersey City, N. J. Brewster Cocoa Co. Three firemen injured.

February 5. Philadelphia, Pa. Dwelling of Max Pomerantz. Entire family of 5 burned to death.

February 10. South Bethlehem, Pa. Greek boarding house. Four persons killed.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

CORRUGATED ASBESTOS AND WIRE GLASS

At the Building Exposition held at Grand Central Palace, New York City, during the week of March 5, the Keasbey & Mattison Company, Ambler, Pa., exhibited its asbestos building material and also corrugated wire glass to be used with its corrugated asbestos material.

Corrugated wire glass is a new product perfected by the Pennsylvania Wire Glass Company exclusively for the Keasbey & Mattison Company, to be used in connection with this company's corrugated asbestos building material especially for skylights. Asbestos shingles and roofings are coming more extensively into use for the reason that combustible roofings are the cause of a great many fires, they being a fertile field for the spread of fire from flying sparks and embers from burning buildings, locomotive sparks, etc.

Further particulars of corrugated wire glass may be obtained from Keasbey & Mattison Company at the above address.

FIRE EXTINGUISHER INSURANCE

Now it is fire extinguisher insurance!

Not only may one insure his house, his factory or his motor car from loss by fire, but now he may insure his fire extinguisher from being stolen.

This new policy is being put forward by the National Surety Company, which has entered into an arrangement with the Pyrene Manufacturing Company through Johnson & Higgins, brokers, 49 Wall Street, New York City, to insure Pyrene fire extinguishers from being stolen from buildings, motor cars, etc.

Under the new arrangement the Pyrene Mfg. Co. attaches to every one of its extinguishers an application for extinguisher insurance with a coin mailer and envelope addressed to the brokers. All the buyer has to do is to place a 25c. piece in the mailer, fill out the small blank, and drop the envelope in a letter box.

The fire extinguisher policy runs for 2½ to 3½ years, depending on the date it is issued, the 25 cents covering the entire cost of the premium for that period.

The extinguisher will be replaced upon proof of loss to the National Surety Company. The Pyrene Mfg. Co. announces that last year it sold more than 350,000 extinguishers. It would seem, therefore, that the field for this class of insurance was far larger than might at first appear.

ELIMINATING THE OILING HAZARD

The Arguto Oilless Bearing Company, Wayne Junction, Philadelphia, Pa., manufactures oilless bearings made of wood which has been chemically treated and which require no lubrication.

Many industrial accidents have resulted through men mounting ladders to oil bearings, from the ladder slipping and the man falling, and from the oiler coming in contact with the moving machinery.

Due to centrifugal motion imparted to oil by pulleys when in operation it is difficult to keep them well lubricated or anything in their vicinity free from oil. Pulleys equipped with Arguto Bushings have been in continuous service for over 9 years. Arguto oilless bearings are also recommended for grinding machines, confectioners' machinery, counter-shafts, electrical machinery, friction clutches, harvesting machinery, textile machinery, shoe machinery and many other types of machinery.

STEAM ACCIDENTS IN INDUSTRIAL PLANTS

Every so often disastrous accidents happen in industrial plants caused by steam. Plants have been wrecked through a bursting steam header. Boiler explosions are preventable if proper attention is given to safety.

The Golden-Anderson Valve Specialty Company, Pittsburgh, Pa., manufactures what is termed "life and property insurance valves," better known as the Golden-Anderson Automatic, Double Cushioned, Triple Acting, Non-return Valve. These valves offer protection against the disastrous effects of accidents to the boilers and steam pipe lines. They auto-

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matically shut off the steam flow from every boiler the instant that a pipe ruptures and immediately cut out the boiler when a tube bursts.

The valves can be closed by steam or electricity from any part of the plant, or they may be closed by hand like ordinary valves. They equalize the pressure between all of the boilers and prevent turning steam into a cold boiler. In time of sudden emergency when steam is to be shut off instantly these valves give instantaneous control and save the time needed for the closure of the ordinary stop valve.

Further particulars can be obtained from the manufacturer above mentioned.

AMERICAN-LA FRANCE SAFETY DEVICES

The American-La France Fire Engine Company, Elmira, N. Y., has for many years been among the leading manufacturers of fire fighting apparatus.

Its fire extinguishers, fire engines, chemical engines, etc., have been widely known among fire fighters throughout the country. The slogan of this company for years has been "Everything For Fire Protection." This concern has now placed on the market an extensive line of safety devices, including smoke and ammonia helmets, emergency hoods, asbestos helmets, sandblast helmets, acid hoods, babbitting masks, respirators, smoke protectors, goggles, asbestos hand protectors, asbestos suits, portable fire escapes, first aid cabinets, steel lockers, and metal signs. In its catalog of safety first devices the American-La France Fire Engine Company states that "To those within and to those outside the fire fighting circle the American-La France Fire Engine Company needs no commendation."

Anyone not familiar with this company is referred to any fire chief, captain or fireman.

EASTMAN NOZZLE SYSTEM

Samuel Eastman Company, Concord, N. H., calls attention in a booklet it has issued to the Perfection Holders, Nozzles and Deluge Sets which it manufactures.

This company states that little attention has been given in the past to the stream either in character, size or handling. Thousands of dollars have been spent for improved fire apparatus, more powerful pumps and larger water mains to increase the capacity for producing more powerful streams, which has been minimized by nozzles on pipes which supply streams deficient in solidity and distance, and which cannot be safely controlled. This company has specialized for years in producing nozzles and holders which meet all emergencies in the most reliable and safest manner.

The efficiency of the Eastman Deluge Sets was demonstrated at Central Falls, R. I., by throwing a 1¾ inch stream over a chimney 210 feet high. The importance of large, powerful streams for extinguishing a large blaze is self-evident. Small streams are only effective for small fires. At 212° F. water is turned into the natural gases. Unquestionably an enormous amount of property is sacrificed each year because of the lack of suitable fire fighting apparatus. Every community should have adequate equipment for the prevention of large fires, for fires often assume large proportions in an amazingly short time.

Eastman Deluge Sets were perfected to provide security against fires so as to prevent disastrous conflagrations. Another instance of the efficiency of the Eastman nozzle stream was demonstrated at Universal City, Mo., when a 1½ inch stream was thrown 56 feet above a building 138 feet high by an automobile pumping engine.

NEW "SQUARE D" ENCLOSED SAFETY SWITCH

The Detroit Fuse & Mfg. Company, Detroit, Mich., announces a new type of "Square D" enclosed safety switch, being a steel enclosed double throw motor starting switch for starting three phase motors.

The switch itself is of the double throw knife blade type with the running side arranged for fuses. In the "Square D" starter the line is brought into the top of the switch and is carried to the switch jaws at bottom of switch through back connectors. When the switch is thrown into starting position the line

New "Square D" Steel Enclosed Double Throw Motor Starting Switch

is connected directly to the motor windings —when thrown into running position the motor and equipment are protected by properly rated fuses through which the current passes. A simple device prevents throwing switch from "off" to "run" position without first going into "Start" position. This device also forces the operator to make a quick throw-over from start to run so that the motor keeps up its speed when the throw-over is made. Like all "Square D" enclosed switches this newest

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one is equipped with a lock-off device which prevents careless closing of the switch while someone is working on the line or apparatus controlled by it. Detachable and interchangeable plates for either conduit or open wiring are provided for use in ends of the boxes. This "Square D" feature makes wiring easy for the man on the job.

Open, New "Square D" Steel Enclosed Double Throw Motor Starting Switch

Star-Delta starting connections can be furnished on this new "Square D" starter. When so used a separate main line switch must be installed ahead of the starter in accordance with the National Electrical Code. The new starter is made for both 250 and 500 volts.

The Detroit Fuse & Mfg. Company was one of the first manufacturers of electrical equipment to realize the importance of safety in the field of electrical apparatus and has for some years given close attention to the development and perfection of safety electrical equipment under the name of "Square D." The company reports that owing to their persistent publicity for several years that an increasing demand has been created for this type of apparatus. Electrical contractors and others not yet acquainted with the "Square D" line should write the Detroit Fuse & Mfg. Company, 1400 Rivard St., Detroit, Mich.

THE MONARCH ENGINE STOP

The Monarch Engine Stop Limit System, manufactured by the Consolidated Engine Stop Company, 350 West 38th street, New York City, is a mechanical device which can be applied to any engine without regard to make, size or speed. It is operated by means of circuit closers placed throughout the plant for emergency use. Its action is automatic and instantaneous if the engine speeds above the safety limit. This safety device prevents flywheel accidents—one of the most serious hazards of an industrial plant. It automatically stops the engine or any power unit if it begins to race; if the governor belt breaks or slips; or the governor becomes jambed; or the governor pulley becomes loose.

Further particulars of this engine satety stop can be obtained from the manufacturer.

STRONG, KENNARD & NUTT CO.

The Strong, Kennard & Nutt Co., manufacturer of the Adjustoglas Goggle, has removed from the Schofield Building to 2044 East 9th street, Cleveland, Ohio.

KRANTZ MANUFACTURING CO.

The Krantz Manufacturing Company, 160 7th street, Brooklyn, N. Y., specializes in the manufacture of safety autolock switches, panel boards, and switch boards, which afford protection from electric shock.

The importance of safeguarding electrical apparatus in industrial plants is indicated by the serious accidents which happen to careless and inexperienced employes.

This company invites correspondence on any feature of preventing electric shock.

BADGER'S CHEMICAL ENGINES

The Badger Fire Extinguishing Company, 32 Portland Street, Boston, Mass., has specialized for many years in the manufacture of portable chemical fire engines which offer efficient fire protection especially for estates, institutions and manufacturing plants.

For general use the 40 gallon tank is recommended. This tank is fitted with 48 inch wheels and has 50 feet of ¾ inch chemical hose with patented non-sticking shut-off nozzle and throws a stream about 75 feet beyond the nozzle. This engine is approved by the Underwriters' Laboratories.

The manufacturer calls particular attention to the construction of the tank. In order to make the Badger tank proof against corrosion for a long period of time, this tank is lined with sheet lead. The necessity for construction which insures reliability is all important in a chemical fire engine, for it is only needed in sudden emergencies. In the presence of fire time is the all important element. It must be ready to be instantly put into service.

Badger engines have been favorably known for years.

WILLIAMS' IMPROVED STRETCHER

This stretcher is recommended for use in industrial plants and mines.

Its leading features are that the occupant does not have to be lifted from it. It is clean and sanitary, and made to withstand hard service.

It is manufactured by the Williams' Improved Stretcher Company, Wheeling, W. Va.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

ASBESTOS BUILDING LUMBER, PLAIN AND CORRUGATED PATTERNS. Asbestos Mfg. Co., Ltd., Mfr., La Chine, Can.

ASBESTOS BUILDING LUMBER, PLAIN AND CORRUGATED PATTERNS. Keasbey & Mattison Co., Mfr., Ambler, Pa.

CLASS B, BUILT-UP ROOF COVERINGS. Baltimore Roofing & Asbestos Mfg. Co., Mfr., Asbestos, Md.

CLASS C, PREPARED ROOF COVERINGS. Heppes-Nelson Roofing Co., The, Mfr., 4500 Fillmore street, Chicago, Ill.

CLASS C, SHINGLE ROOF COVERINGS. Heppes-Nelson Roofing Co., The, Mfr., 4500 Fillmore street, Chicago, Ill.

CONCENTRIC FILL AND VENT FITTING. Nebraska and Iowa Steel Tank Co., Mfr., 13th and Willis avenue, Omaha, Neb.

ENCLOSED SWITCHES. Detroit Fuse & Mfg. Co., Mfr., 1400 Rivard street, Detroit, Mich.

FRAMES—SINGLE TYPE. Thorp Fireproof Door Co., Mfr., Minneapolis, Minn.

FUSIBLE LINKS. General Fire Extinguisher Co., Mfr., Providence, R. I. Fusible links for use in connection with automatic closing devices for doors, windows, and other automatic devices requiring fusible links.

"GRINNELL, IMPROVED 1903" AUTOMATIC SPRINKLER. Canadian General Fire Extinguisher Co., Ltd., Mfr., 1200 Dundas street, Toronto, Ont.

GRINNELL ISSUE "A" OPEN SPRINKLERS (Window Sprinklers). General Fire Extinguisher Co., Mfr., 275 W. Exchange street, Providence, R. I.

GUARDING DEVICE FOR PUNCH OR STAMPING PRESS. Frontier Meter Works, Mfr., 12 Waverly street, Buffalo, N. Y.; Acme Guard Co., Submittor, 150 Nassau street, New York, N. Y.

HARDWARE—LOCKS. Dearborn Hardware Mfg. Co., Mfr., Chicago, Ill. For Vonnegut Hardware Co., Indianapolis, Ind.

HARDWARE—LOCKS. Bayer, Gardner & Himes Co., The, Mfr., 81-85 Sunswick street, Long Island City, N. Y.; J. Gleckner, Submittor, 894 Forest avenue, Bronx, N. Y.

HARDWARE—LOCKS. Payson Mfg. Co., The, Mfr., 2920 Jackson Boulevard, Chicago, Ill.; Vonnegut Hardware Co., Submittor, Indianapolis, Ind.

HOLLOW METAL FIRE WINDOW FRAMES. Consolidated Sheet Metal Works, Mfr., 661-677 Hubbard street, Milwaukee, Wis. Hollow metal fire window frames and sash for wired glass.

HOLLOW METAL FIRE WINDOW FRAMES. C. F. Haglin, Mfr., 228-232 Lumber Exchange, Minneapolis, Minn. Hollow metal fire window frames and sash for wired glass.

HOLLLOW METAL FIRE WINDOW FRAMES. Metallic Roofing Co. of Canada, Ltd., Mfr., 797 Notre Dame avenue, Winnipeg, Manitoba.

HOLLOW METAL FIRE WINDOW FRAME. Louis A. Ruda, Mfr., 2306-2310 S. Kedzie avenue, Chicago, Ill.

HOSE, RUBBER-LINED. Bi-Lateral Fire Hose Co., Submittor, 326 W. Madison street, Chicago, Ill.

INSIDE HAND-OPERATED DISCHARGE DEVICES. Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

INSIDE HAND-OPERATED DISCHARGE DEVICE. Wayne Oil Tank & Pump Co., Mfr., Ft. Wayne, Ind.

LIQUID FIRE-RETARDING PAINT. Wadsworth-Howland & Co., Mfr., 82-84 Washington street, Boston, Mass.

MORSE FIRE DEPARTMENT CONNECTION CAPS. A. A. Morse, Submittor, Chicago, Ill.

OUTSIDE, HAND-OPERATED, DISCHARGE DEVICE. Western Oil Pump and Tank Co., Mfr., 2437 Kosciusko street, St. Louis, Mo.

SLIDING OR SWINGING, SHEET METAL, FIRE WALL DOOR. Richards-Wilcox Mfg. Co., Mfr., Aurora, Ill.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Wm. A. Cross & Co., Mfr., 533 Quincy street, Chicago, Ill.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. H. W. Goetzman, Mfr., corner Water and River streets, Rochester, N. Y.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Wells & Emerson, Mfr., Cumberland street, Port Arthur, Ont.

TURPENTINE SUBSTITUTE. "No. XVIII SPECIAL." The Sun Co.,Mfr., 1428 So. Penn Sq., Philadelphia, Pa.

TURPENTINE SUBSTITUTE. "No. XCIX SPECIAL." The Sun Co., Mfr., 1428 So. Penn Sq., Philadelphia, Pa.

UNDERGROUND STORAGE TANKS. Milwaukee Tank Works, Inc., Mfr., 146 Clinton street, Milwaukee, Wis.

UNDERGROUND STORAGE TANKS. Nebraska & Iowa Steel Tank Co., Mfr., 13th and Willis avenue, Omaha, Neb.

WELDING MACHINE. Detroit Electric Welder Co., Mfr., 253-255 La Fayette avenue, Detroit, Mich.

FIRE WINDOW FRAMES. Pullman Mfg. Co., Mfr., Rochester, N. Y. Unit sash balances for sliding Type.

HOLLOW METAL FIRE WINDOW FRAMES. Biersach & Niedermeyer Co., Mfr., 216 Fifth St., Milwaukee, Wis.

HOLLOW METAL FIRE WINDOW FRAMES. Dillon Co., W. E., Mfr., 183 George St., Toronto, Can.

HOLLOW METAL FIRE WINDOW FRAMES. Moeschl-Edwards Corrugating Co., The, Mfr., Covington, Ky.

INSIDE, HAND-OPERATED, DISCHARGE DEVICES. Crescent Mfg. Co., The, Mfr., 771 Mather St., Chicago, Ill.

INSIDE, HAND-OPERATED, DISCHARGE DEVICE. Western Oil Pump & Tank Co., Mfr., 2437 Kosciusko St., St. Louis, Mo.

"MALTHOID CEMENT PAINT." The Paraffine Paint Co., Mfr., 34 First St., San Francisco, Cal.

OUTSIDE, HAND-OPERATED DISCHARGE DEVICE. Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

SASH LOCKS FOR SLIDING WINDOWS. Russell & Erwin Division, American Hardware Corp., Mfr., New Britain, Conn.

SLIDING OR SWINGING, SHEET METAL FIRE WALL DOOR. Consolidated Sheet Metal Works, Mfr., 661 Hubbard St., Milwaukee, Wis.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Minnesota Roofing & Cornice Works, Mfr., 133 Twelfth St., St. Paul, Minn.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Norman-Seton, Inc., Mfr., Winfield, L. I., N. Y.

SWINGING, HOLLOW METAL, EXTERIOR WALL DOOR. Central Metallic Door Co., Mfr., 2412 W. 22nd St., Chicago, Ill. National Automatic Door Co., Chicago, Ill., submittor.

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SAFETY ENGINEERING

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Explosives and Other Dangerous Articles in Transportation

THE annual report of the Bureau of Explosives for 1916 by Colonel B. W. Dunn, Chief Inspector, is full of interest.

One table shows the total number of accidents due to dangerous articles while in transit or stored pending removal from railway property and the deaths, personal injuries and property losses by those accidents.

The accidents due to explosives, in transit or stored as above described, were 16 in number, causing a property loss of $20,012,419. Acids and corrosive liquids caused 605 accidents with a property loss of $113,437. Inflammable liquids caused 165 accidents with a property loss of $268,377. Inflammable solids and oxidizing materials caused 172 accidents with a property loss of $81,062. Compressed gases caused 30 accidents with a property loss of $6,809. Unlisted semi-dangerous articles caused 109 accidents with a property loss of $134,690.

By these 1,097 accidents 7 persons were killed and 171 persons were injured. Accidents caused by explosives were responsible for 5 deaths and 107 injuries. Acids and corrosive liquids caused 37 injuries but no deaths. Inflammable liquids caused 2 deaths and 14 injuries. The accidents attributed to inflammable solids and oxidizing materials caused no fatalities and no injuries. Compressed gas accidents injured 9 but killed none. Unlisted semi-dangerous articles injured 4 but killed none. Ninety-seven and six hundredths of the property losses were caused by explosives disasters.

The Black Tom Island catastrophe was responsible for most of the property loss, most of the deaths and many of the injuries.

The total accidents, property loss, number killed and number injured, caused by dangerous articles while in transit or stored pending removal from railway property, compare as follows for a period of 7 years:

Year	No. of Accidents	Prop. Loss	No. Killed	No. Injured
1916	1,097	$20,616,794	7	†171
1915	669	1,246,329	70	619
1914	519	292,388	13	118
1913	490	359,623	2	40
1912	335	338,582	8	21
1911	264	128,616	12	26
1910	401	809,027	17	20

† Includes figures for Black Tom explosion.

The transportation of other dangerous articles, covered by the Interstate Commerce Commission regulations, caused a loss in 1916 of $469,685, of which $137,860.81 was charged to gasoline. In the period, 1910-1915, the transportation of gasoline caused $1,178,556.65 of property loss, a much larger loss than was attributed to any other cause except explosives.

Charcoal, in transportation or storage on railroad premises, is a constant troublemaker. Practically all of the trouble, Chief Inspector Dunn says, comes from the transportation of charcoal manufactured in the distillation of hardwood for alcohol and acetate of lime.

The "strike-anywhere" match is another cause that scores every year. Last year 70 accidents were caused by these

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SUMMARY OF REPORTED ACCIDENTS IN 1916, CAUSING FIRES, PERSONAL INJURIES, OR PROPERTY LOSS OCCURRING IN THE TRANSPORTATION OF ARTICLES NAMED IN THE FREIGHT OR EXPRESS LISTS OF DANGEROUS ARTICLES.

ARTICLE	No.	PERSONS KILLED	PERSONS INJURED	PROPERTY LOSS
Acid, Sulphuric	255	0	24	$19,338.82
Acid, Hydrochloric (Muriatic)	165	0	1	2,166.97
Acid, Nitric	116	0	10	48,197.94
Charcoal	81	0	0	15,955.60
Gasoline	70	1	11	137,860.81
Matches, Strike Anywhere	70	0	0	28,543.06
Alcohol	35	0	0	58,883.13
Electrolyte	24	0	0	209.15
Gas, Compressed Carbonic Acid	23	0	0	76.45
Bromine	10	0	0	19,752.34
Paint	10	0	0	138.62
Acid	9	0	1	133.54
Acid, Hydrofluoric	8	0	0	947.96
Naphtha	6	0	0	33,305.85
Shellac, Varnish	6	0	0	20.62
Batteries, Storage (Charged with Acid)	5	0	0	25.50
Cologne Spirits (Alcohol)	5	0	0	33.32
Varnish	5	0	0	5,048.21
Ether	4	0	0	11.03
Matches, Strike on Box	4	0	0	9.90
Moving Picture Films	4	0	0	32,468.31
Petroleum Crude (Oil)	4	0	2	18,577.50
Phosphorus Trichloride	4	0	0	55.00
Acid, Nitrating (Mixed)	3	0	1	22,045.38
Burnt Cotton	3	0	0	580.00
Gas, Compressed Acetylene	3	0	1	32.82
Acetone	2	0	0	55.35
Acid, Hydrofluosilicic (Corrosive Liquid)	2	0	0	40.49
Distillate	2	0	0	50.26
Gas, Compressed Pintsch	2	0	0	6,667.56
Iron Sponge, Spent, etc	2	0	0	320.00
Liquefied Petroleum Gas	2	0	1	125.00
Oil, Gas	2	1	0	578.03
Compounds, Paint or Varnish Removing	2	0	0	28.80
Permanganate of Potash	2	0	0	.....
Rags, Wet	2	0	0	21.00
Tin, Tetrachloride (or Bichloride) of	2	0	0	294.25
Acetate, Amyl	1	0	0	16.41
Acetyl Chloride (Corrosive Liquid)	1	0	0	3.00
Acid, Sludge (Corrosive Liquid)	1	0	0	226.50
Benzine	1	0	0	4.20
Benzol	1	0	0	10,368.67
Cement, Roofing (Liquid)	1	0	0	810.00
Cement, Rubber	1	0	0	8.30
Coal Tar Light Oil	1	0	0	1,890.01
Collodion	1	0	0	26.75
Columbian Spirits (Alcohol, Wood)	1	0	0	10.00
Gas, Compressed Chlorine	1	0	8	30.75
Gas, Compressed Oxygen	1	0	0	1.75

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Lacquer	1	0	0	1.23
Naphtha, Distillate	1	0	0	525.00
Phosphorus, Yellow	1	0	0	4.10
Pyroxylin Plastic in Sheets	1	0	0	235.33
Pyroxylin Plastic Scrap	1	0	0	25.00
Soda, Nitrate of	1	0	0	2,900.00

matches while in transportation, but the property loss was comparatively small, only $28,543.06. A large proportion of the fires from this cause were due to train wrecks. The products of 15 companies manufacturing "strike-anywhere" matches started fires in 1916 while the shipments were still in the hands of the railroads.

In the transportation of acids and other corrosive liquids there was an unusual increase in the number of fires and damaged shipments in 1916, primarily due to the increased traffic in these materials. In the transportation of nitric acid the fires numbered 51, an increase of 40 over 1915. In the handling of all kinds of acid shipments during 1916, 37 persons were injured. In one instance the injuries were due to the use of excessive air pressure in unloading a tank car of mixed acid. Air pressure in excess of 30 pounds per square inch should not be utilized in unloading acid tank cars, for the reason that any excess pressure may be the cause of straining the tank or of injury to railway or other employes.

In January, 1917, the Bureau of Explosives addressed a circular letter to the manufacturing shippers of nitric acid to the following effect:

As a result of numerous fires which have occurred during the past year in the transportation of nitric acid in carboys, a thorough investigation has been made which has shown the necessity of using more efficient methods of fastening the stoppers. The general experience with earthenware stoppers set in plaster of paris covered with burlap, or with earthenware stoppers set in clay covered with burlap, has shown that such methods of closure are unsatisfactory, for the reason that they fail to keep the stopper securely in place during transit. The splashing and slushing of the acid loosens the clay or plaster of paris and works up to the burlap covering, causing a deterioration of this material and leakage of the acid. Various fires have been traced to this source. In many carboys examined soft clay has been used, which has not hardened and which had very little effect in holding the stoppers in position. When the clay falls away from the stopper, the stopper itself is no longer in the neck of the bottle, having been lifted out by the splashing of the acid.

With respect to carboy boxes, many carload shipments have been examined in transit by our chemist and by our inspectors and the carboy boxes were found to be in bad condition due to the action of the nitric acid on the wood. Some of the carboys were cushioned with the grooved wooden cleats, known as the "Stahl" packing, which packing depends on the strength and flexibility of the wooden strips or springs in the corners of the box. The action of the acid on these strips is such as to render them brittle, and in transportation they are very readily broken. This breakage permits the sides of the carboys to bear directly against the sides of the boxes.

In the shipments examined the stoppers of the carboys had become loose and the acid had splashed out. In one carload one-half of the boxes on the top tier showed such splashing. The condition of the cars, the boxes and the bracing showed no evidence of rough handling and the leakage of the acid was apparently due to the insecure method of fastening the stoppers under normal treatment such as all cars are subjected to in transportation. Deteriorations of the wooden boxes and of the wooden cushioning strips is inevitable with the present methods of closing the carboys. Therefore, improvement over the present method of stoppering is necessary, not only with the "Stahl" packed carboy, but with all other carboys used for the shipment of nitric acid.

This serious situation which our investigation has developed shows the necessity for immediate and radical change in the methods of stoppering, cushioning, etc. The matter was placed before the Executive Committee of the Manufacturing Chemists' Association at a meeting of this committee in New York City, October 4, 1916, and it was urged that the use of clay or plaster of paris with burlap covering be condemned, and that arrangements be made to securely fasten the stoppers by a mechanical device and proper gaskets. The committee recorded an opinion in favor of a proposed change to become effective May 1, 1917,

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such change if effective to require that after that date all carboys of nitric acid shall be closed by glass or earthenware stoppers held firmly in position by metal clips and the joint made by a proper gasket, such as asbestos or similar substance of a non-combustible nature.

The transportation of 92 other articles, not named in the list of dangerous articles, but possessing in some degree dangerous characteristics, caused 109 accidents, injured 4 persons and caused a property loss of $134,690.26.

How to Reduce Accidents in Mines

By E. C. Lee

Assistant to the Director, Department of Inspection and Safety, The Associated Companies, Pittsburgh

Author's Note: "What one cause produces the most accidents in the mine and what would you recommend to reduce the same?" This question appeared in the Pennsylvania Bituminous Mine Inspectors' Examination, March, 1917.

FROM what standpoint are you going to look at this question? Are you going to look up all the available statistics from the various State Departments of Mines and the United States Bureau of Mines, or are you going back of these statistics to see if there is not an underlying cause not given or even indicated in these statistics?

If you are going to follow the first course, you will find that falls of coal or roof are responsible for anywhere from 40 per cent in the Pennsylvania anthracite field to 60 per cent in the Iowa field, of the total number of fatalities, and presumably also of the total number of accidents. The same statistics will indicate that no other cause is responsible for anywhere near the same percentage of accidents, and it is, therefore, falls of coal or roof which must be guarded against.

Protection from falls of coal and roof naturally varies with the nature of the roof, and there are many items which are classed as causing dangerous conditions, among these being such features as slips, rolls, pots, cutters, horsebacks, niggerheads, clay veins, draw slate, water crevices, and the like. Pillar robbing naturally introduces a hazard even in naturally secure roof, and the height of the seam enters to a considerable extent, particularly in considering falls of coal from the face. In view of these different elements which may affect the safety of the roof, and the fact that they may appear singly or in conjunction with one another, it is naturally impracticable to attempt to lay down a fixed rule for reducing the hazard from these sources. Certain fixed standards may be adopted, however, with a limited variation from them when necessary.

All entries, slopes, haulageways and the like, should be timbered in such manner as to afford the maximum protection from falls of slate, rock, coal, or broken or rotten timber. Timbers should be promptly set in rooms or rib drawing, and when necessary should be promptly renewed in entries. Timbers should, whenever practicable, be set before shooting. Props should be set as near the working face as the conditions of the roof and the method of mining may require, and wherever possible there should be a systematic method of timbering, with such additional props or timbers as may be required because of unusual conditions.

The dimensions of entries, rooms and pillars should be such as to provide for the greatest safety. The mine layout should be as regular as natural conditions will permit, all working places being laid out regularly, and

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preferably driven on surveyed sights, with the exception of rooms driven up the pitch and water level roads driven across the pitch.

In ordinarily safe working places with little danger of falling coal, each working place should be inspected by an official as early as practicable each morning. Where roof is dangerous, or pillars are being pulled, and in general when roof is considered to be bad, and there is danger of falling roof and coal, each working place should be inspected and tested by an official from three to five times daily. The first inspection should be made within two hours after the men enter the mine, and the miner should also inspect the roof and face before starting to work and after firing each shot. Where conditions are such as to produce a naturally dangerous roof, an inspection should be made by an official before the men are allowed to enter the mine. It is very seldom that the fire-boss inspection, made for gas before the men enter the mine, reveals any besides exceptionally dangerous conditions in the roof, for the fire-boss generally has enough work to do if he makes a systematic inspection for gas, unless his section is so small that he has time to examine for both gas and bad roof.

Entries or slopes used for hauling or traveling ways should be inspected daily by the foreman or other mine official, at which time all portions of the roof or timbering that may need attention should be marked in a legible manner, and instructions promptly given to the proper employes.

The company should see that there is at least one day's supply of timbers, cap pieces and sprags convenient to all working places, these to be of such material, shapes and dimensions as the conditions may require. Some of the State mining laws require that the miner shall order the necessary props, etc., at least one day ahead, and that the company shall furnish such supplies on receipt of orders from the miners. Some mines have adopted the rule, however, that props will be sent in to a miner's working place whenever an inspection reveals the fact that his supply is below a specified number of props, thus insuring there being a constant supply of material at all working places.

All undercut coal should be securely spragged or propped every 6 to 10 feet, depending on the condition of the coal and the liability of accident from falls of unspragged coal. Where miners must lie down to undercut the coal with picks, or with punching machines, where the machine runner is unduly exposed, and where the district has a history of accidents from falling undercut coal, ample sprags should be provided for each working place, and the miners should sprag the coal at regular intervals.

The recovery of timbers is hazardous. If timbers are recovered, they should be pulled by approved mechanical means; otherwise all timber pulling should be conducted in an approved and systematic manner by and under the supervision of men experienced in such work.

The method of mining, whether undercutting or overcutting, shearing or shooting off the solid, should be such that it will not injure the roof. The location of shots is naturally determined by the method of mining, and there are many instances where the roof is injured to a much greater extent by high shots in undercut coal than by lower shots in solid shooting. The question of undercutting or of shooting off the solid, then, is not one which directly affects the safety of the roof, but only to such an extent as it determines the location of the shots. If any props are discharged by shooting, they should be replaced before any other work is done in the place. The amount of explosive used in a shot and the position of the shots, should be such as to have a minimum effect on the safety of the roof.

As safety men, we must all admit that the above precautions are necessary, and should be followed out in all mines, but will the mere following out of these rules have the desired effect in reducing the accidents? Unquestionably it will have a considerable effect, but will it go far enough? The

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problem of accident prevention is one of importance to each of us. No one who has given the matter careful study believes that all mining accidents can be prevented. After we have taken every possible precaution there will still remain a certain percentage of accidents which we cannot hope to eliminate. We can, however, accept it as a fact that *most accidents happen because someone, employer or employe, does not care enough.* Acceptance of this fact leads us to the further fact that many of these accidents, attributable to carelessness, can be prevented by educating the mine officials and the workmen along safety lines.

Some hazards are very apparent and no man working in their vicinity can fail to be impressed with the danger from them. Sometimes the danger is not so apparent and does not therefore impress itself so clearly on the minds of men; yet whether the danger is open or hidden, a wholesome respect for danger decreases danger, while carelessness multiplies it. We must, therefore, find a remedy for *carelessness, the greatest enemy to safety, and therefore the cause which produces the most accidents in the mine.*

The one safeguard which has proved effective in reducing the number of the severity of accidents is caution, evidenced either by the provision of mechanical guards by the employer, by a careful oversight on the part of the officials, or by the regard of the workman for the safety of himself and his fellow employes. This sense of caution, no matter how evidenced, must be recognized as the chief factor in accident prevention.

Education is the foundation rock in accident prevention. It is believed that education and inspection can eliminate the majority of the preventable accidents. Education does not imply such an education in mining as will make engineers, foremen or mine managers, but simply such instruction as deals directly with the miner at the working face so that he may be supplied with more adequate knowledge for performing his daily work with greater personal safety.

It is estimated that 40 per cent of the total number of accidents is due to what is called the moral hazard, or to defects in the human machinery about the mine. This being true, the officials and the employes must be educated in caution, which someone has described as being "a wise mixture of example, counsel and discipline." It is a common practice to expect that the workman will readily recognize the fact that caution is necessary in his work, knowing as he does that the results of a foolhardy action must usually affect his own welfare; but the habit of taking chances, and the attitude of reckless indifference to danger have been evidenced in generation after generation of workers, who have fallen into the evil of taking accidents too much as a matter of course. This class of workman must be taught that most accidents are the result of carelessness, either of failure to place sufficient value on the hazard, or of absolute indifference and recklessness.

(To be concluded.)

National Fire Protection Association

Program for the Twenty-First Annual Meeting, in Washington, on May 8, 9, and 10

TUESDAY, May 8, 10 a. m., at the New Willard Hotel:

1. Roll Call.
2. President's Address.
3. Report of Executive Committee.
4. Resolutions.
5. Reports of Secretary-Treasurer and Editor.
6. Membership Committee Report.
7. Public Information Committee Report.
8. State Fire Prevention Associations, Committee Report.
9. Canadian Committee Report.
10. Five-minute report from Members on Work in Fire Prevention.

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11. Fire and Accident Prevention Day Committee Report.
12. High Value Districts Committee Report.
13. Electrical Committee Report.
14. Marine Fire Hazards Committee Report.

AFTERNOON SESSION, 2 P. M.

15. Nomenclature Committee Report.
16. Field Practice Committee Report.
17. Private Fire Supplies from Public Mains, Committee Report.
18. Standard Hose Couplings, Committee Report.
19. Round Table Discussion (3 p. m. sharp).

Subject: Hazards of Ammunition Manufacture, Storage and Transportation.

Topic (a) Safeguarding Ammunition Factories. W. D. Milne, Inspector Underwriters' Bureau of New England, Boston, Mass.

Topic (b) State Regulation of Ammunition Storage and Manufacture. Hon. John Price Jackson, Commissioner Pennsylvania Department of Labor and Industry, Harrisburg, Pa.

Topic (c) Transportation of Explosives. Col. B. W. Dunn, Chief Inspector Bureau of Explosives, New York, N. Y.

Rules for Discussion.—Each topic will be separately discussed after its presentation by the principal speaker. Any member may participate. Remarks must relate to the topic and be confined to a time limit of *five minutes.* The principal speaker may close the discussion.

WEDNESDAY, MAY 9, 10 A. M., AT BUREAU OF STANDARDS

1. Automatic Sprinklers, Committee Report.
2. Standardization of Pipe and Pipe Fittings, Committee Report.
3. Tanks, Committee Report.
4. Fire Pumps, Committee Report.
5. Standpipe Systems, Committee Report.
6. Hydrants and Valves, Committee Report.
7. Openings in Walls and Partitions, Committee Report.
8. Roof Openings and Cornices, Committee Report.
9. Safety to Life, Committee Report.
10. Address, Dr. S. W. Stratton, Director Bureau of Standards, U. S.

AFTERNOON

(a) Luncheon at Bureau of Standards.
(b) Column tests: Fire tests with panel furnace: inspection of Laboratories.

THURSDAY, MAY 10, 10 A. M., AT NEW WILLARD HOTEL

1. Explosives and Combustibles, Committee Report.
2. Round Table Discussion:

Subject: Safeguarding Life in Theaters.

Topic (a) Planning Theaters for Safety. Clarence H. Blackall, Architect, Chairman Fire Prevention Committee, Boston Chamber of Commerce, Boston, Mass.

Topic (b) Fire and Police Department Supervision. Major Raymond W. Pullman, Superintendent of Police, Washington, D. C.

Topic (c) Responsibilities of the Manager. R. S. Robbins, Manager Keith's Theater, Washington, D. C.

3. Laws and Ordinances, Committee Report.
4. Fire-resistive Construction, Committee Report.
5. Uses of Wood in Building, Committee Report.
6. Manufacturing Risks and Special Hazards, Committee Report.
7. Reports of Delegates to Conventions of other bodies.
8. New business.
9. Report of Nominating Committee and Election of Officers.

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Hazards of Locomotive Engineers

By Frederick S. Crum

Assistant Statistician, Prudential Insurance Company of America

ACCORDING to an extensive correspondence with railway companies throughout the country, covering the period 1900-1906, the fatal accident rates per 1,000 of employes engaged in specific railway employments were as follows: Locomotive enginemen, 4.35; locomotive firemen, 4.48; conductors, freight and passenger, 7.71; other trainmen (chiefly brakemen), 10.87; switchmen, flagmen, and watchmen, 5.68; section foremen, 1.65; other trackmen, 1.71. These data are of such interest that they are presented in detail in the following table:

FATAL ACCIDENT LIABILITY, RAILWAY EMPLOYES, UNITED STATES, 1900-1906.

EMPLOYMENTS	NUMBER OF EMPLOYES	NUMBER KILLED	ACC. RATE PER 1000 EMPLOYES
Officials and officemen	32,176	12	0.37
Station agents and men	91,614	23	0.25
Enginemen	27,154	118	4.35
Firemen	29,048	130	4.48
Conductors	21,398	165	7.71
Other trainmen	57,497	625	10.87
Shopmen	130,145	86	0.66
Section foremen	23,568	39	1.65
Other trackmen	164,914	282	1.71
Switchmen, flagmen, watchmen	31,874	181	5.68
Telegraph operators and dispatchers	17,583	3	0.17
Other employes	116,563	309	2.65
All employes	743,534	1,973	2.65

These statistics would be still more valuable if it were possible to separate the employes according to kind of train service, that is, whether passenger or freight. This is quite difficult, however, as many of the railway trainmen are employed on mixed trains, that is, trains carrying both passengers and freight. There are, however, sufficient and reliable data available to warrant the statement that freight-train service is generally much more hazardous than passenger-train service as regards most men employed thereon. This holds true for nearly all of the specific employments. For illustration, there is a considerable difference between the fatal accident liability of freight brakemen and passenger brakemen, nor is there any comparison between the fatal accident liability of freight and yard-train conductors and passenger conductors. There are also wide differences between the fatal accident liability of passenger locomotive engineers and firemen and freight locomotive engineers and firemen.

According to statistics of the Federal Government collected for the three years 1907, 1908 and 1909, the fatal accident rate for all locomotive engineers was 3.86 per 1,000 employed; for passenger engineers the fatal accident rate was 5.55; for freight engineers 4.15; for yard engineers 1.66; and for engineers on mixed trains the rate was 4.15. In other words, on passenger trains the exposure of the enginemen to fatal accident is greater than on freight trains, or the comparative conditions in this respect are reversed with reference to locomotive engineers, who are in contrast with other trainmen. In this same Federal experience the fatal accident liability for all locomotive firemen was 3.92; for passenger firemen the fatal accident rate was 4.10; for freight firemen, 4.69; for yard firemen, 1.90; and for firemen on mixed trains, 4.42. Among all railway conductors in this Federal experience the fatal accident rate was 3.96; for passenger conductors the rate was 1.54; for freight conductors, 4.65; for yard conductors, 4.37; and for conductors on mixed trains, 7.62. For all railway brakemen in this Federal experience the fatal accident rate was 9.01 per 1,000 employed; for passenger brakemen the rate was 2.73; for freight brakemen, 10.79; for yard brakemen, 8.60; and for brakemen on mixed trains the rate was 11.41. These rates vary considerably also for different sections of the country. Generally speaking, in the South and West the fatal accident rates are higher than

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in the Eastern and North-Central States.

The fatal accident experience of locomotive engineers is particularly interesting in view of the fact that these men are highly trained and skilled mechanics who are required to undergo a comparatively long period of training before they are considered competent to assume the responsibility of running a locomotive.

Enginemen, or locomotive engineers, are responsible for the manipulation and care of the engines while on duty. They start, stop, shift and make up trains, subject to the conductors' orders. The duties of the engineman are those demanding intelligent action at all times and the exercise of quick and sound judgment in case of emergency. Besides operating the mechanism necessary to run the engine, the engineman must watch his boiler and lubricator, see that the train air brakes work properly, keep a sharp lookout for signals, blow the whistle or ring the bell at the proper points and keep as nearly as possible to schedule time, regulating the speed according to long experience and a thorough knowledge of the road. These various duties require the strictest attention, especially on a fast train, where a momentary lapse of attention might mean a disastrous accident. At stopping points the engineman oils the engine and does more or less wiping of the same. The engineman also directs the work of his fireman.

The duties of the engineman are so arduous and responsible that advancement to the position of even a freight engineman is usually through a long series of promotions in the lower grades of the railway service. According to an investigation made by the New Jersey Bureau of Statistics of Labor and Industries in 1892, of 448 enginemen considered, 202, or 45.1 per cent, began service as firemen; 160, or 35.7 per cent, as brakemen; 79, or 17.6 per cent, as engine wipers, and 7, or 1.6 per cent, as switchmen. The direct promotion to engineman however, is always from fireman.

According to an intensive investigation in New Jersey covering the 20-year period, 1888 to 1907, 70 enginemen were killed in New Jersey during that period and 601 were more or less seriously, but non-fatally, injured. Of the 70 killed, 25 were killed in collisions, 9 in derailments, 9 from breaking of parts of engine, 9 by being struck or run over by engines or cars, 7 were struck by overhead obstructions, 5 were killed while coupling or uncoupling, 3 were killed by falls from engine or cars, one was shot, one committed suicide and one was found dead in his cab. Of the 9 killed by broken parts of the engine, 6 were the result of boiler explosions and one was the result of an exploding cylinder head.

In this connection it is interesting to note that as a direct result of the organization in 1911 of a locomotive boiler inspection service under the supervision of the Interstate Commerce Commission the number of fatalities among enginemen has been suddenly and considerably reduced in the United States. The record of this new safety work is even more emphatic when all fatalities resulting from locomotive boiler explosions are considered, for then it appears that in 1912 there were 91 fatal accidents due to locomotive boiler explosions; in 1913, 36; in 1914, 23, and in 1915 only 13.

This favorable experience in fatal accident reduction as a direct result of a thorough and well-organized system of locomotive boiler inspection is so interesting that it would seem well worth while to give the statistics in detail and they are presented in the table on the next page.

Considering the occupation of engineman it appears that as recently as 1912 there were 22 deaths of locomotive engineers on interstate railways from boiler explosions; in 1913 this number had been reduced to 12; in 1914 to 8; and in 1915 to 5. There has also been a considerable reduction in the number of non-fatal injuries to enginemen, or from 310 in 1912 to 150 in 1915. It is hardly necessary to comment in further detail on the table, as the statistics are self-explanatory.

One of the most valuable mortality

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PERSONS KILLED AND INJURED IN THE UNITED STATES IN LOCOMOTIVE BOILER EXPLOSIONS, 1912-1915.

OCCUPATION	1912		1913		1914		1915		1912-1915	
	KILLED	INJURED	KILLED	INJURED	KILLED	INJURED	KILLED	INJURED	KILLED	INJURED
Members of train Crews	53	903	32	834	17	530	13	405	115	2,672
Engineers	22	310	12	268	8	187	5	150	47	915
Firemen	19	491	12	478	8	290	7	207	46	1,466
Brakemen	8	79	6	79	...	46	...	40	14	244
Conductors	4	16	2	7	1	6	1	4	8	33
Switchmen	...	7	...	2	...	2	...	4	...	14
Roundhouse and shop employes.	29	97	2	70	6	73	...	38	37	278
Boiler makers	2	3	...	10	1	18	...	5	3	36
Machinists	7	11	...	11	2	5	...	10	9	37
Foremen	1	4	...	4	1	6	...	2	2	16
Inspectors	1	2	...	3	...	3	...	3	1	11
Watchmen	3	6	...	8	1	7	...	1	4	22
Boiler washers	1	4	...	4	...	8	...	9	1	25
Hostlers	...	5	1	6	...	9	...	6	1	26
Other roundhouse and shop employes	14	62	1	24	1	17	...	2	16	105
Other employes.	3	2	2	3	...	1	...	1	3	19
Non-employes	6	2	2	3	...	1	...	1	8	7
Grand Total	91	1,005	36	911	23	614	13	467*	163	2,997*

*21 injured not distributed by occupation.

experiences of locomotive enginemen is that available in the monthly returns of the Locomotive Engineers' Mutual Life and Accident Insurance Association. During the ten years 1907 to 1916, inclusive, no fewer than 7,345 deaths have been recorded in this experience, with the age and cause of death accurately stated in nearly every instance. These deaths are based upon no fewer than 627,700 enginemen exposed to risk for an average period of one year. Of the total deaths recorded 2,057 were from accidents, or 28 per cent of the total. In the average life insurance experience the expected accident proportion would be from 8 to 10 per cent.

The age distribution of the deaths by accidents in this experience was as shown in the accompanying table.

AGE DISTRIBUTION OF DEATHS FROM ACCIDENTS, EXPERIENCE OF THE LOCOMOTIVE ENGINEERS' MUTUAL LIFE AND ACCIDENT INSURANCE ASSOCIATION, 1907-1916.

AGES	NO. OF DEATHS	PERCENTAGE DISTRIBUTION BY AGE
20-29	133	6.5
30-39	696	33.8
40-49	746	36.3
50-59	384	18.7
60-69	86	4.1
70 and over	12	0.6
Total	2,057	100.0

It is interesting to note also that in the mortality from accidents a large proportion of the fatalities occur to locomotive engineers in their early life. Of the 2,057 accidental deaths in this experience 829, or 40.3 per cent, occurred at ages under 40; 746, or 36.3 per cent, occurred at ages 40 to 49; 384, or 18.7 per cent, occurred at ages 50 to 59; 86, or 4.2 per cent, occurred at ages 60 to 69, and only 12, or 0.6 per cent of the total, occurred at ages 70 and over.

The accident mortality of locomotive engineers does not tell the whole story of the risks incident to their employment. An even more pitiable story of the hazards is perhaps told in the mutations which these brave and conspicuously efficient men endure in order that passengers and freight may be transported by rail. Loss of sight in one or both eyes is exceptionally fre-

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quent and loss of one or more limbs—usually leg or legs—represents a physical impairment more frequently met with in this employment than in any other large groups of employes, save only railway brakemen and locomotive firemen.

The age at which these serious physical impairments occur is indicative also of the serious chances taken by locomotive engineers when they elect to pursue that employment. Of the 305 blinded in one eye this partial loss of vision occurred at ages under 40 in 98 cases; at ages 40 to 59 in 158 cases, and in only 49 cases did the impairment occur at ages 60 and over. Of the 19 cases completely blinded 5 occurred at ages under 40; 13 occurred at ages 40 to 59, and the other case occurred at age 70. Of the 169 cases involving loss of one leg, 77 occurred at ages under 40; 79 at ages 40 to 59, and only 13 at ages 60 and over. Of the 5 cases involving loss of both legs, 1 was only 23 years old, and the others were aged 30, 36, 41 and 44, respectively.

In this exposure of 627,700 locomotive engineers for an average period of one year, and during the ten years 1907 to 1916, inclusive, the following permanent disabilities were recorded:

PERMANENT DISABILITIES OF LOCOMOTIVE ENGINEERS, BY AGE AT TIME OF OCCURRENCE.

NATURE OF PHYSICAL IMPAIRMENT	UNDER 40	40 TO 59	60 AND OVER	TOTAL
Blind, 1 eye	98	158	49	305
Blind, both eyes	5	13	1	19
Loss, 1 arm	16	33	5	54
Loss, both arms	1	..	..	1
Loss, one hand	15	17	2	34
Loss, 1 leg	77	79	13	169
Loss, both legs	3	2	..	5
Loss, 1 foot	27	24	1	52
Loss, both feet	..	1	..	1
Loss, 1 leg and 1 arm	..	..	1	1
Totals	242	327	72	641

Of the total of 641 serious permanent disabilities more than one-third occurred at ages under 40, more than one-half at ages 40 to 59, and only about 11 per cent or one-ninth of the total occurred at ages 60 and over.

The natural causes of death to which locomotive enginemen are especially liable according to this experience are the following in the order of their numerical importance:

Nervous diseases	1,138
Heart diseases	975
Bright's disease	713
Respiratory diseases	508
Digestive diseases	456
Tuberculosis of the lungs	334
Cancer	324
Diabetes	138
Typhoid fever	129

Enginemen are peculiarly liable to nervous diseases, owing to the mental strain and eye strain caused by constant attention. There were no fewer than 481 deaths from apoplexy alone in this experience, there were 209 deaths from paralysis, and 84 cases of insanity. Owing, possibly, in part at least, to the constant jarring of the body in a seated position there is an exceptional liability to diabetes and Bright's disease among locomotive enginemen. Tuberculosis is not exceptionally frequent, but typhoid fever is of more than average frequency among both enginemen and firemen. This is due to the fact that these men are employed in hot work, particularly in the summer and the year round in the South, and they are likely to drink raw water, often polluted, from the tanks along the line, out of which the locomotive boilers are filled.

Locomotive enginemen are also peculiarly liable to affections of the ear and the resulting deafness is likely to be more dangerous than color-blindness as regards defection of signal codes. This disease factor was quite extensively commented upon in 1881 by Dr. Moos in *Zeitschrift-für Ohrenheilkunde* Vol. IX. p. 370. The possibilities in the way of serious accidents from a gradually acquired deafness in a locomotive engineman are too obvious to require lengthy discussion.

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The Amazing Story of Pittsburgh's Neglect

By Wilbur E. Mallalieu

General Manager, National Board of Fire Underwriters

THE disastrous fire in Pittsburg January 27 has two aspects: it was an event and a symbol. As an event of important and spectacular nature, it took its place among the news items of the day. It aroused a fleeting interest among the residents of Pittsburg, and was noted casually by most of the papers of the country. One more fire in a nation which indulges in more than 1,500 fires every day does not command a large degree of attention.

It chanced, however, that the Pittsburg fire was a symbol as well as an event. It was a symbol in such a peculiar and remarkable degree that numbers of papers throughout the United States have been moved to comment on the fact. In this symbolic feature lies its chief significance.

To go back a little, a field party of engineers, employed by the committee on fire prevention of the National Board of Fire Underwriters arrived in Pittsburg in January, 1915, for the purpose of making a thorough inspection of the various elements relating to fire hazard presented by the city. These engineers were instructed to take nothing for granted, but to get all their information at first hand. They were highly trained and experienced specialists, and they devoted the months of January, February, March and April to the task, going into each element with the utmost thoroughness. It was their duty to see whether Pittsburg's water supply was adequate to the requirements of a special emergency; to learn whether the fire hydrants were well placed, of the right types and in good condition; to determine the efficiency of the fire alarm system; to make a study of the building conditions and of special hazards, notably those in the congested value district. In particular, it was their duty to give careful consideration to the equipment, personnel and management of the fire department in order to see whether its fire houses were well distributed, its apparatus of good design and sufficient in quantity, its men efficient in numbers, training and spirit, and its officering and management free from the deadly influence of politics. The engineers went into all of these subjects from an utterly unprejudiced standpoint for the purpose of determining existent facts, in order that their report should be a comprehensive and scientifically accurate diagnosis of Pittsburg's fire hazard.

REAL PUBLIC SERVICE

It would be supposed that a city of such vast commercial and industrial interests would have rejoiced at a searching diagnosis of this character, since conflagrations are almost the greatest calamity that can occur in any community. A warning should be the first step toward correction. From this standpoint the inspection of Pittsburg, entirely at the expense of the National Board of Fire Underwriters, was a public service to the citizens. The service, however, went much further than the mere ascertainment of conditions, for the engineers accompanied their diagnosis with a complete set of recommendations whereby all defects might be corrected in the quickest, most efficient and most economical way. It may be said that if these recommendations had been carried out in all particulars, fire protection in Pittsburg would have approached an ideal condition. Can anyone, with the lessons of San Francisco, Baltimore, Salem, Chelsea and other cities in mind, question how greatly such results would have been for the interests of the citizens?

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As already stated, the report paid especial attention to the congested value district lying in the wedge between the Allegheny and Monongahela rivers. Here in a number of blocks are great business structures teeming with occupants and stored with many millions of dollars in value. Close to the geographical center of this district the engineers found in the block bounded by Smithfield, Diamond and Wood streets and Fifth avenue conditions of extraordinary hazard. These conditions were described in their report as follows:

DANGER IS SHOWN

"In the eastern part, a group of three to four-story dry goods and department stores, with partly protected floor openings, communicate through partly protected wall openings to form an excessive area. In the central part is an excessive area four-story joisted brick theater, without automatic sprinkler equipment. Other occupancies are mainly motion picture shows and 5 and 10 cent stores. Two joisted buildings are six stories high and four are of large area. The block is compactly built, having no vacant space. Buildings are of various heights, and there are many inaccessible, exposed and unprotected windows in the interior of the block by which a fire once well started in some of the large buildings of hazardous occupancy, could readily sweep through the block and threaten adjoining blocks in the south and west."

In order to emphasize their view of the seriousness of the peril, the engineers prepared a map of the congested value district and indicated this one block in solid black. Thus it could not be overlooked. It stood as a menace to the welfare of the city. Its central position gave it a peculiar possibility for spreading conflagration in case of a gale blowing from any direction. Repetition of the San Francisco or Baltimore disasters was easily possible if the conditions found in this block were allowed to remain.

Herein lies the symbol of January 27. Pittsburg, abundantly warned, specifically instructed, pigeon-holed the report with characteristic American carelessness and optimism, and promptly forgot all about it. A few weeks would have sufficed to have made the required corrections at this point. Instead of this, more than 18 months elapsed after the publication of the National Board report upon July 13, 1915, and then the inevitable happened, exactly as foretold, and a strictly preventable fire caused an inexcusable loss of several million dollars. Through great good fortune this was not accompanied by loss of life, but it requires no argument to show how easily this might have been a feature of the disaster.

EQUIPMENT UNDERMANNED

The fire is now past history. The city probably is tired of discussing it and would like to forget it comfortably. But while its news value may have ceased, its symbolic value is insistent. For, after all, the improvement of this block constituted only one of the recommendations which the National Board engineers urged upon the city, and the purpose of this article is to call attention to a much greater and more dangerous menace that remains still uncorrected, namely, that of an undermanned fire department permeated with politics. Between 1:57 and 4:34 a. m. eight different alarms were turned in. It is reported that these alarms brought out a total of 23 companies and 141 men. The National Board report fixes 174 men as the minimum strength of these companies, and the lack of the 33 firemen unquestionably must have been a large factor in the sweep of the fire. Only one of the companies engaged—Ladder Company 5—turned out the full minimum that should have been available; all of the other companies represented a deficiency of from one to three men apiece. Since each company has a unit value in such a fight, it can be realized that practically all of the force engaged was in a seriously crippled condition. Pittsburg paid heavily in the early morning hours of January 27 for permitting such dangerous and inexcusable conditions to exist, and yet the lesson will have been a cheap one if the citizens determine to render its repetition impossible.

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FORTUNATE IN TIME

Suppose, for example, that this fire had not broken out in the dead of the night, when the downtown district was deserted. Suppose that it had come at a time when the buildings were filled with people, and had come in a way which gave it a headway that could not be controlled. An appalling loss of life easily might have resulted. Suppose that it had not been a calm night, but that a gale of wind had been blowing. Suppose, too, that instead of being free to concentrate upon this one fire, one or more other fires in the city had divided the attention of the department at the same time. It is a perfect possibility that Pittsburg might have ranked with San Francisco, Baltimore and Chicago in the list of historic conflagrations. Its escape in this case was due to what may well be called undeserved good fortune.

For, example, on January 9, 1909, New York had to deal with not two, but five, simultaneous fires, of which one was very great and two others of much more than the usual extent and activity. These fires called out 40 engines, 12 battalion chiefs and over 600 men, as compared with the 141 who are said to have responded in Pittsburg. On August 9, 1910, Boston had two simultaneous fires that called out practically the entire fire department and much apparatus from surrounding cities. If either of these fires had been a little larger, or if a third fire had started in any congested section, a bad conflagration undoubtedly would have occurred.

REAL TEST MAY COME

Let it be understood, then, that while the fire of January 27 was an emergency, it was by no means such an emergency as the Pittsburg fire department might have been called upon to meet, or may yet be called upon to meet. It is not a sufficient explanation of a large loss to say that it occurred under unusual conditions. Unusual conditions are exactly those for which fire departments are provided. A department is essentially an emergency organization. It is not constituted as a berth for "deserving politicians." It is not even primarily concerned with the welfare of its men, although every city should treat with consideration the courageous and skillful public servants who form the bodies of most fire departments. The principal purpose of such an organization is to provide its community with protection against that awful calamity, a general conflagration, and its secondary function is that of extinguishing the ordinary run of fires and of promoting measures to lessen their occurrence.

In fulfilling this secondary function, the department, of course, is giving the most practical kind of service in protecting the city from a general conflagration, since it is preventing any such conflagration from becoming a reality. However, there is a very clear distinction that must never be overlooked. Protection from conflagration hazard is so much the main objective of the fire department that it is never a sufficient achievement for such a department to be able to deal with ordinary blazes under usual conditions. The supreme test is the test of great emergency—such an emergency as may never come, but one which is an ever-present possibility.

DANGER SIGNS PLAIN

Pittsburg has not yet faced its great emergency. It was not found in the fire of January 27. If it were found, the present department, however fine may be its individual material, would be woefully inadequate to deal with the requirements. The city, in all probability, would suffer terribly, and would suffer quite unnecessarily.

To revert again to the recent fire: It occurred in a block where the signs of danger were plainly to be read by any competent observer. They were so read by the National Board engineers, who made a specific record of their findings and turned this record over to the authorities, the press and the civic organizations of the city. The warning was not heeded, and in due time the fire occurred in natural consequence. It is reported that when the fire occurred 23 companies of firemen responded promptly to the several alarms, and 141 men worked with courage and energy to extinguish the flames. It was not the fault of these 141 men that they were 33

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short of the 174 men urged by the National Board as the minimum strength of these companies, but it needs no argument to show that it was a disastrous mischance for companies to be compelled to go into a great fight nearly 25 per cent too few for effective work. According to reports, one engine, that of Company No. 24, had a crew of only five men; Nos. 4, 7, 10, 11, 12, 15, 19, 32, 42 and 46 had only six men each, and none of the others was manned by more than seven men.

COMPANIES LACK MEN

A steam fire company engine operating in a downtown mercantile district has no business responding to a fire with six or even with seven men. The engineer and stoker must confine their attention to operating the engine, and there should be enough additional men to handle the two lines of hose which engines of the size in service in the downtown district of Pittsburg should easily supply. Two men per line is certainly not enough for this work, especially at night, when the men are handicapped by darkness, and considering also the possibility of night fires gaining headway before discovery. Thus, if the statistics as to the number engaged were accurate, it will be seen that Pittsburg met its big fire with a number of engine companies, of which every one was seriously crippled at a time of emergency, through sheer lack of sufficient men for effective work, notwithstanding the individual skill, bravery and spirit of those who responded.

Through the fortunate coincidence of a calm night and a lack of fires in other parts of the city, the loss was practically confined to one block, although, even there, it is hard to believe that it might not have been less by some hundreds of thousands of dollars, had the companies been of full strength when called into action.

Should Pittsburg continue this menacing condition until the time of its real test, the resultant catastrophe will not be "an act of God," but an inevitable result of purely human negligence.

BASED ON AUTHORITY

In order to demonstrate that these statements are not dogmatic, but are based upon incontestable authority, I wish to quote from a few of the many expressions received by us from prominent fire chiefs in different cities. Chief Kenlon of the New York fire department says:

"My experience leads me to assume that it requires nine men at night to be the equivalent of seven men during the day. The two-platoon system reducing the strength of the companies at night is one of many arguments I have advanced against it."

Fire Chief Murphy of Philadelphia says: "At night the strength should be just as great as possible, owing to the fact that the danger is greater."

Thomas R. Murphy, first chief of San Francisco, a city which has had an abundant opportunity to learn the lesson of conflagration, has this to say: "In my opinion there should never be less than eight men in an engine company, nine men in a truck company and four men in a separate chemical company. The above number of men is absolutely the minimum that should be assigned to any of the above companies at any time either day or night. * * * There is no question that there is a greater difficulty in fighting fires at night against those coming in the daytime. * * * Hence it is already apparent that the night shift should be stronger than the day shift, thereby avoiding as much as possible the sending in of second, third or greater alarms, which in all instances means the leaving of certain parts of the city unprotected. That is one thing that a chief of a fire department should give very serious consideration to at all times."

NIGHT FORCE LARGER

Louis O. Pujol, fire chief of New Orleans, writes: "In my opinion the night force of companies should be larger than the day force in order to offset the handicaps which are met by companies responding to and working at fires in the night time. * * * If a minimum daytime strength of seven men is desirable for an engine or ladder company responding to alarms * * * the night crew of same company should be

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increased by at least two more men, especially in the double-platoon service."

Chief Bywater of Salt Lake City says: "It is very evident that it requires more men to effectually operate the apparatus in the darkness of the night where there are all kinds of handicaps to operate against effective, quick work, so that in my judgment it is necessary to have at least two-thirds more men as quickly as possible at the fire through the night than it is through the daytime."

- To these might be added many other expressions of similar import.

Pittsburg's department responded at a time when it should have been strongest with a force that was far short of even its day-time needs. Here again the warning of the National Board report was specific and unmistakable.

WARNING MADE PLAIN

On page 60 of this report appears a paragraph, in bold-face type, preceded by a star as an indication of special importance, containing these words: "That additional members be appointed so that the least number of men on duty at any time, including meal hours, shall be as follows:

"Seven in engine and manually-raising ladder companies in high-value district.

"Note—Under the two-platoon system each platoon should have one or more men than the above minimum required under the continuous duty system."

Had this recommendation been complied with, it would, as already stated, have given 174 men in the companies which are said to have responded on January 27. However, recent study of requirements and the expressed opinion of the leading fire chiefs of the country have convinced us that even this figure is below the reasonable requirements for night service, and we are now recommending two additional men at night over and above the daytime strength. The latter allowance would have given these companies a total strength of 196 men upon the night in question.

So much for the important question of the number of men on duty. There remains one of possibly even greater importance—that of the influence of politics upon a department which should be notably free from such distraction. Upon this the National Board makes a comment (page 35) as follows:

POLITICS ARE BANEFUL

"Supervision is by the director of public safety, dismissable at the will of the Mayor, and the effects of the harmful political influence which permeates the entire department are very apparent. The present chief of the department is a purely political appointee, without previous fire department experience, and there is no deputy chief with full power to act as chief during the latter's absence. . . . The trial records show that in many cases members who have been dismissed for good cause, after many convictions for serious offenses, have been reinstated; in consequence of this, discipline is seriously impaired and the authority of the officers is slight. The existence of a labor union among the firemen does not make for efficiency and may lead to disastrous results."

It needs no argument in any modern American city to support the contention that politics has no legitimate place in such an organization as a fire department. It repeatedly has been demonstrated in many cities that such influence is highly detrimental to its efficiency.

Let it be understood that the purpose of this article is as far as possible removed from that of merely desiring to find fault. We are anxious that our whole relation to such conditions as those in Pittsburg should be thoroughly constructive, and feel that no greater service can be done to the citizens of a great and wealthy city than that of warning them in advance of serious peril and of pointing the way to a place of safety. It is in this spirit and this alone that we have discussed the situation.

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Rescue Work at a Montana Mine

Beneficial Results of the Bureau of Mines Safety Campaign

THE following information is supplied by D. Harrington, district engineer at Butte, Mont. The facts presented furnish a concrete illustration of the beneficial results of the Bureau of Mines safety campaign and also illustrate the manner in which the work is already being carried beyond the range of the bureau's activities by its "graduates."

A serious fire broke out in the Leonard copper mine at Butte, Mont., on February 23. On February 28 a workman was asphyxiated in the West Colusa mine from fumes originating in the Leonard mine, and a rescue party of 5 men, without apparatus, attempted to reach him where he lay on the fourth floor of a stope, between the 900-foot and 1,000-foot levels. The rescue party went in on the 900-foot level and soon encountered gases, but considered themselves safe and attempted to proceed about 600 feet to the top of the manway above the stope.

RESCUE PARTY IN PERIL

Before making such progress the party realized they were in danger of being overcome, and attempted to retrace their steps. Four of the men reached the 900-foot level, but the other one fell on the second floor about 16 feet below the level. He was allowed to remain where he fell, a rope being attached to him and fastened to a post on the 900-foot level.

PULMOTOR EQUIPMENT

Meanwhile J. L. Boardman, formerly with the Bureau of Mines, but now mine safety engineer for the Anaconda Copper Company, entered the mine with 3 sets of Draeger apparatus, but found no one present who was able to wear apparatus and assist him. He proceeded into the 900-foot level wearing apparatus and encountered the mine foreman crawling at practically the end of the gaseous area. About 100 feet farther in he found a man who was partly overcome and assisted him to the shaft and fresh air base.

HEROIC WORK BY SAFETY ENGINEER

Mr. Boardman then re-entered the gaseous area, and about 250 feet from the shaft met another man crawling out, and assisted him to the shaft. Boardman returned for the third time, encountered another man, and was carrying him out when a man from the station, without apparatus, rushed in and assisted him to carry the man to safety. At this point a miner who had never worn apparatus volunteered to put one on and accompany Boardman back to where the man had been left attached to the rope. When the man was reached Boardman had his assistant hold the rope on the 900-foot level while Boardman went down into the raise 16 feet below, placed the rope under the unconscious man's arms and placed him in the timber chute. He then returned to the level above and helped his assistant hoist the man, after which they placed him on a truck and pushed him to fresh air, a distance of 600 feet.

SCHAEFER METHOD

The man, who was of course totally unconscious, was then brought to the surface and Boardman, assisted by others, applied the Schaefer method of artificial respiration for 40 minutes before he started to breathe. At the expiration of this period he was given oxygen. Later on he was taken to a hospital and recovered completely.

Mr. Boardman also assisted in the recovery of the body of the asphyxiated man on the fourth floor above the 1,000-feet level.

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Siphons and Safety

Manufacture, Hazards and Precautions to Be Observed

By Robert L. Morrow, Compensation Inspection Rating Board, New York

THE last time you ordered a case of siphons you may, or you may not, have thought of the numerous precautions that had been taken by the manufacturer to insure you a perfectly safe drink. When you stop to think that the little siphon is charged to about the same pressure as that carried on a steam boiler, and that careless people often take a warm siphon and plunge it into an ice box or let it stand outside the window to freeze, and that the siphon must stand all this and more, without breaking, you begin to wonder just how a mere glass bottle is able to do it.

The matter has been considered very carefully by at least one manufacturer and a system of tests has been originated which duplicates at the factory, but in a more severe way, the extreme changes of temperature to which the siphon may be subjected when in use. The tests are extremely practical and have served their purpose for many years. Not only this, but they are original, and the underlying principles are very simple.

A siphon consists of two parts, the bottle and the head. The bottles are imported from Austria, and must be of the best glass, thoroughly annealed. The usual process of annealing, which is done before the bottle comes here, consists in taking it, while still hot, to an oven, letting it remain there for a long time while a gradual cooling occurs. The finished bottle must be absolutely free from blow holes and, even one such hole is a sufficient cause for rejection. Referring to Fig. 1, it will be seen that the bottle is of about the same diameter throughout its body, gradually tapering at the top, and ending in a flanged neck upon which the head can be clamped. The glass is about ⅜ inches thick, except at the bottom, where it is somewhat thicker, to withstand shock. The head is made of pure block tin and is threaded on the inside. Thus, when a split collar is slipped over the neck of the bottle and the head screwed on, a perfectly tight joint is formed. All other metal parts with which the gas comes in contact are block tin to prevent corrosion from the carbonic gas. The lever and spring are silver plated for the same reason. We thus have the peculiar condition of an article silver plated on the inside instead of the outside.

The apparatus shown in Fig. 2 consists of an open tank, hand operated pumps with gages, and frames for holding the bottles, so connected with the pumps that pressure may be applied on the bottles. The tank is filled with water and, to insure a uniform temperature of 32 degrees F., cakes of ice are always floating therein. Each of the frames holds five bottles and is surrounded by a wire cage of rather coarse mesh, for when a bottle breaks, being under hydraulic pressure, no glass flies, the bottle collapsing as it were. The cages then, are merely to prevent pieces of broken glass from falling on the floor and cutting the operator's feet. The bottles are tested before the heads are put on. They are filled with water at a temperature of 98 degrees F., and are clamped in the frames as shown, a hydrostatic pressure of 350 pounds per square inch being applied for half a minute. The pressure is then reduced to 125 pounds per square inch and the whole rack of bottles is lifted and plunged into the tank of ice water. Because of the sudden temperature drop, from 98 degrees F., to 32 degrees F., any defect in the glass will cause the bottles to break. Of the several tests applied, most of the broken bottles occur here, about 3 per cent of the Austrian bottles breaking and a much higher per-

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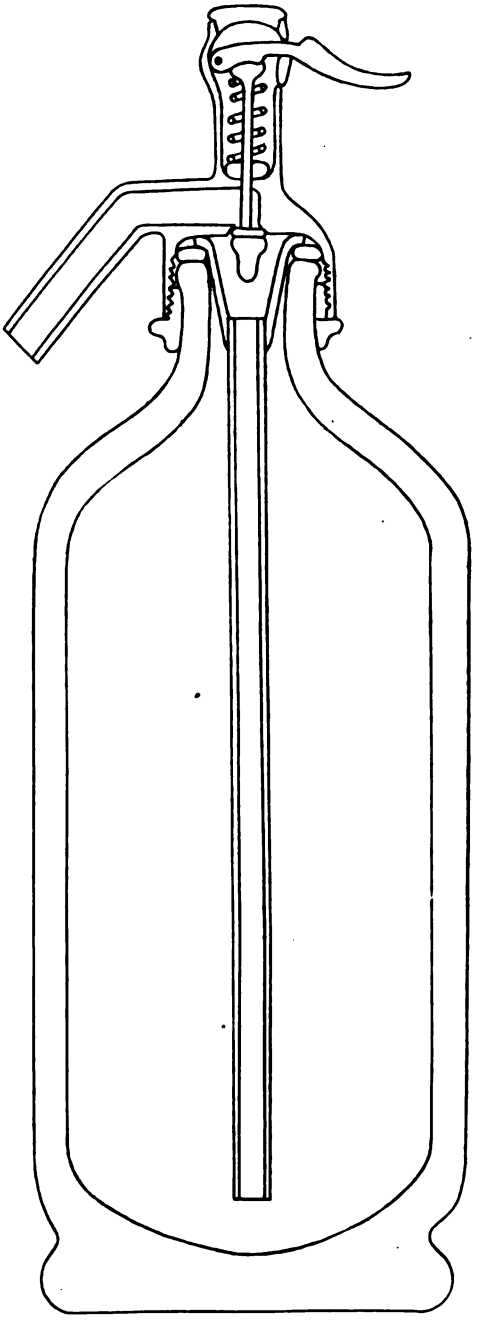

Fig. 1.

centage when those of American make are used.

The next test is with the head on the bottle. This consists in filling at 160 pounds pressure, with carbonated

Fig. 3.

water, letting it stand for 24 hours. During this operation the bottles are stored in their cases, the arrangement of cases being such that a bottle exploding will not injure anyone. Very few bottles break here, showing the thoroughness of the previous tests. After this the carbonic is blown off and the bottles are ready to be charged for the consumer.

Precautions taken in filling the siphons are interesting although not unusual. First let us describe the generating process.

Chemically pure sodium bicarbonate is received in barrels and stored near the generating room in the basement.

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Oil of vitriol or sulphuric acid, is the other chemical employed. A generator is about 5 feet long and half that in diameter. It consists of a horizontal copper drum lined with lead, with riveted heads and joints and contains a revolving paddle driven from belt and pulley at one end. The bicarbonate is put in through a hand hole, the cover is clamped on and the drum half filled with water. The agitator is started and sulphuric acid allowed to trickle in through a pipe, the acid being fed from a container fastened on the wall. The action of the acid on the sodium bicarbonate liberates carbonic acid gas, which flows off through a conducting pipe, the arrangement being such that the pressure in the generator never gets over 2 to 3 pounds. The gas freely flows over to a tank of permanganate of potash solution and bubbles through this, then passes through charcoal, these chemicals removing all the odors and impurities. The pure carbonic gas then passes up through a tin pipe to the carbonator. It might be mentioned here that all receptacles and pipes in which the carbonic gas is contained are lined with tin to prevent corrosion.

Courtesy of Carl H. Schultz. **Fig. 2.**

The carbonator (shown in the background of Fig. 3) consists of a brass drum lined with block tin. The water and gas are pumped in causing the two to mingle and mix thoroughly. The pump has two inlet pipes, one from the water, one from the gas. On the down stroke of the piston the water and gas are sucked in and on the up stroke, the inlet valve closes and an outlet valve opens, forcing the water which is now charged with carbonic gas, up into the carbonator which acts as a reservoir. This safety valve has a set at 150 pounds and a gage (see illustration) to show the operator at what pressure he is filling.

The filling machine (also Fig. 3) is adjacent to the carbonator and consists merely of a cage and bracket within which the siphon is placed. When placed therein, the siphon is inverted, the cage is closed, a valve is opened and the carbonic water allowed to flow in at 125 pounds pressure. When the siphon is about half full the pressure within it equals the charging pressure. It must therefore be "sniffed," that is to say a little of the gas must be blown off. It can then be charged further and until almost full. The cage surrounding the bottle is quite a safety feature for it is made of iron wire No. 13, the spaces between the wires being about 3/32 inches. When the cage door, which is partly sheet metal and partly wire, is closed the cage locks and even if the bottle explodes the glass will be held from flying and cutting anyone. Some times the operator will accidentally knock the siphon against the frame with sufficient force to break the siphon, either when putting it in or removing it from the cage. To protect him in such contingencies, he wears a mask which is much like a baseball catcher's mask, except that it is of dif-

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ferent mesh. It is No. 8 mesh and No. 20 gage. The operator also wears straw or leather wristlets as an added protection and to prevent the veins and arteries in his wrist from being cut.

After filling, the labels are pasted on by hand, as no machine has yet been invented to successfully paste labels on the necks of siphons.

Siphons are shipped in a form of box which deserves mention because of its unique and safe construction. The case bottom is held on, not by nails, which soon become loose and often drop out, but by strips of iron across the bottom, one on each end, and by long bolts which extend up through the ends of the box. The hand holes of course weaken the box and may cause it to split, but with the bolts, this cannot happen.

About Boiler Safety

By R. L. Hemingway

Safety Engineer, Industrial Accident Commission, California

SO much has been written on the subject of boilers that it would almost seem as if there were no more to be said, and at the outset it would, perhaps, be as well to admit that this little article is not going to contain anything new about boilers. The object is, stated plainly, to try to bring home to our readers some idea of the terrific energy that is stored in a boiler under pressure.

Let us take, for instance, a boiler carrying a pressure of, say, 65 pounds per square inch, and in these days this is an exceedingly low pressure. Possibly the best parallel that can be found will be to compare the energy stored in the water in this boiler to that of gunpowder, and it can be shown quite conclusively that there is as much energy in one cubic foot of water in that boiler as there is in one pound of black gunpowder. Suppose we take a common-sized boiler, 54 inches in diameter by 14 feet in length. This boiler will probably contain not less than 180 cubic feet of water, each cubic foot with a potential energy of one pound of gunpowder. Under these circumstances, it behooves every one of us to handle this stored energy with a great deal more respect and consideration than is commonly shown.

Now about the various points that will aid in treating this stored energy with the consideration it merits: Of course, the primary requirement is a boiler capable of withstanding the pressure that is carried upon it, and this should be determined by the inspection of a thoroughly qualified and competent inspector. In the operation of the boiler, the attendant can, by following the recognized rules of operation, greatly minimize danger that may come, either from over-pressure or from lack of water. Various fittings and appliances are provided with every boiler and none of these can be regarded as superfluous. Let us take, for instance, the gage glass. This appliance is intended to indicate the true level of the water in the boiler and on an accurate knowledge of this level largely depends the safe operation of the boiler. The fittings of such a water glass are provided with means by which the glass can be blown out, yet it is a fact that this appliance is seldom used in a large number of stationary boiler plants. Almost invariably one will find that the boiler has three try cocks alongside the gage glass, which are placed there for the purpose of checking the accuracy of the water glass. Since necessity has shown that these try cocks should be put on the boiler, does it not naturally follow that they ought to be tried frequently, not only to prove the level of the water in the glass, but also to prove that the cocks themselves are in proper working order? In all probability there is no more neglected appliance on any boiler than these same poor, unoffending try cocks, and yet if the gage glass breaks and another cannot

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be readily obtained, they are the boiler attendant's sole guide as to the true level of the water in the boiler, on which his safety, and possibly the safety of many others, depends.

The safety valve is another appliance with which every boiler must be equipped. As the name implies, this valve is put on to prevent over-pressure on the boiler, and when the boiler is first installed, a safety valve, set to blow at the safe working pressure of the boiler, is always provided, and yet, strange to say, very few engineers or boiler attendants seem to think it necessary to test the safety valve, either by running up the steam pressure or by lifting the valve from its seat by the lever that is provided. One can only liken such men to those who would sit on a barrel of gunpowder smoking a cigarette.

The bottom blow-off pipe of a boiler is provided, not only for the purpose of draining the boiler, but also, and probably of more importance, for the purpose of blowing out scale or sediment which otherwise settles in the bottom of the shell and there bakes hard, so forming an inner lining of the boiler, which prevents the heat of the fire being transmitted to the water inside the boiler, and in consequence the shell of the boiler, or in some cases it may be the tubes, becomes overheated and in many instances is accompanied by serious distortion and sometimes explosion. The moral, therefore, is that the blow-off valve ought to be opened not less than once each day and the boiler allowed to blow for a sufficient period to very largely remove any sediment that may have accumulated at the bottom of the boiler.

The life of the boiler is something that is entirely problematical. One is often asked, "How long will a boiler last if I put one in?" and the answer is that it all depends upon the treatment it receives.

One of the worst enemies to a boiler's life is corrosion, and whilst this may be due to a variety of causes, one that is perhaps not as fully recognized as it ought to be is the corrosion caused by leakage. We have all seen how a stream of water running down a hillside will cut out a groove for itself, and in exactly the same manner a jet of steam or water leaking from any part of a boiler will assuredly cut a groove for itself, which, in time, by reason of the moisture and steam acting on the plates in conjunction with the atmosphere, results in serious corrosion and wasting away of the plates. A leak, no matter how trifling, should be stopped the moment it is discovered, and in order that it may be discovered, it follows then that any one having charge of a boiler ought to make frequent and careful inspection of it, even though the boiler be inspected by a qualified inspector.

These are only some of the precautions that are necessary in the handling of steam boilers, and it is thought that any one who will give heed to these will surely recognize other precautions, and by so doing may assist the cause of safety by eliminating boiler explosions.

Patsy Kildare, Outlaw

The Long Jump

Judd Mortimer Lewis in The Chicago Daily News

EARLY this morning when I went into the room that I had fixed up the paint was dry and I was certainly proud of my job. It was a room that any Irish little girl could be proud of. As there was a little paint left and the seats of the chairs did not look as classy as the rest of them, I painted the seats, too, and they looked better. I would have been satisfied then if I had not sat on one of them to look at the other. After that I had as much paint behind me as I had in front of me. When we went down to breakfast we left a green streak the whole length of the banister. When

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the cook saw the green paint she asked me what I had been doing. I said, "What's it to you?" So she did not ask me anything more.

It took Rowdy and me a long time to get home and we tippytoed in to keep from waking my father. I got me a different dress which was clean and looked so nice that I asked Rowdy if he did not think I ought to put a ribbon in my hair to go with it. He wagged his tail, so I knew he did and I did and he looked proud of me as we went up the street together. We went over to the railroad back of the school and rambled toward Barney and Mary's.

When we came to the big bridge at the river we walked out on it, though Rowdy did not want to. He put his four feet on the first piece of wood the rails were nailed to, and whined, with his hind feet on the ground. I took him by one ear and pulled, and he came along and kept looking at me and back at the shore and whining. When we got to the middle of the bridge I lay down and looked through at the river. Then I noticed something and I put one ear to the rail and I could hear music. I held one of Rowdy's ears against the rail, but he did not like it and whined worse than ever, and crawled to me with his belly almost against the bridge.

The music got so loud I could hear it without putting my ear to the rail. Rowdy was trembling all over. Then I heard somebody holler and I looked and a man was hollering at me and waving both his arms as if he wanted me to go farther away from him. I was not near him anyway, so I stuck out my tongue at him, but I could not hear what he was saying and the music was getting louder. He looked behind him and then he came running and then a train came around the bend behind him and whistled and when he heard it whistle he certainly did run.

He got to Rowdy and me as the train was coming on to the bridge and it was whistling all the time. The man's face was white and his eyes were very big. Rowdy and I got out of the middle of the bridge to let him go by, but he grabbed me up and looked around at the train. I do not know what made me do it, but I grabbed Rowdy by his ear and then the man jumped and took me with him and I took Rowdy along by the ear. I forgot about the river being there and I thought when we hit the earth we would get an awful bump, and I was sorry I had pulled Rowdy down with us, and I thought the man was crazy.

I heard the roar of the train going over the bridge and then I was in the water over my head and Rowdy's ear pulled out of my hand and then we were all swimming. The man kept trying to help me till he saw I could swim and then we all got to shore and the man lay down on his stomach on the grass with his face hid by his arms and lay there quite a long time. Then we heard a toot! toot! and the man looked up and there was the train backing on to the bridge and rows of heads stuck out of the windows. The train stopped and the man in the engine hollered, "Are you all right?" The man got up and said, "All right!" and motioned him to go ahead and he did.

The man said to me, "Do you not know better than to go on a trestle? That train would have ground you up like sausage. It could not have stopped in time to keep from it." I said, "For cat's sake!" He said, "Now, git out of here, you and your kyoodle, and do not let me catch you on that bridge again." So we did and he won't, but I did have sense enough to say, "Thank you." When we got to the top of the hill I waved and he waved and Rowdy wagged. That dog was certainly happy. He knows a lot, but I know as much about bridges now as he does. That was certainly a long jump. I should like to try it by myself some time, but I shall never go on that bridge again.

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EDITORIAL

Team Work in the Safety Movement

WITH much approval of the sentiments expressed, SAFETY ENGINEERING publishes in this number a splendid article by Mr. H. W. Forster on "Team Work in Practical Service to Humanity." He discusses the co-operative relations that exist between the National Safety Council and the National Fire Protection Association and makes the point that "the same ignorance, carelessness and reprehensible disregard of the rights of others, that are responsible for a large majority of our accidents underlie most of our fire causes as well." As causes of fires and accidents are similar, so also the remedies are similar. No plant or property, he says, that claims to be progressive can afford not to pay systematic attention both to fire prevention and to accident prevention. The National Safety Council and the National Fire Protection Association, having similar objects, to conserve life and property, are now working hand in hand under the Banner of Safety. That is right and proper. Their lines cross at many points and it would be a waste of effort if each followed its own path as an exclusive specialist.

The Need for "Eternal Vigilance"

THE most profound study of the Black Tom Island disaster was made by the Bureau of Explosives, New York City; and Colonel B. W. Dunn, chief inspector of the bureau, reached the conclusion that an incendiary fire was started for the purpose of destroying the great store of explosives in the railway cars and barges at Black Tom Island. "An exceptional opportunity was presented," Colonel Dunn remarks, "if anyone in that vicinity desired the destruction of the war material to such an extent as to be indifferent to the attendant loss of innocent life and property; *all of the known facts seem to justify the assumption that this catastrophe was due to a fire started by a criminal of this type.*" A similar explanation would probably hold true of the numerous "fires" and "explosions" in munition plants, of which scores have been recorded, chiefly in New Jersey, Pennsylvania, New York and Canada. At the present moment, when international relations are upset, there is reason to expect a repetition of criminal acts of the kind mentioned by Colonel Dunn. Eternal vigilance by the authorities, by manufacturers, by transportation companies, by loyal workmen and other good citizens is the only safeguard to rely upon.

Offers Its Services to the Nation

ARTHUR WILLIAMS, president of the American Museum of Safety, sent out an announcement canceling the dinner in connection with the presentation of the medals of the museum, planned for April 19. Mr. Williams said: "The country now being at war, it is thought undesirable to hold the proposed dinner, but the museum trusts that in another year the usual arrangements may be resumed." Being a purely social event, the dinner was canceled; but the museum's work will be more than ordinarily important during the period of war owing to the great industrial activities. The museum has tendered its services to the National, State and City governments in the present crisis. It has also offered all of its facilities to the Council on National Defense, Washington.

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 276 VARIOUS INDUSTRIES—SUDDEN STARTING OF MOTORS.—Realizing that starting boxes or switches may be thrown in at any time by some unauthorized person, through ignorance, curiosity or for some other reason, in our opinion the locking of power control is necessary. By this means absolute protection will be afforded those whose duties require their working on lines, line shafts, belting or about machinery, from the accidental or unexpected starting of a motor or the throwing in of a switch. A substantial lock should be provided and the person detailed to do the required work should personally lock the handle of starter or switch, keeping the key in his own custody until work has been finished.

Where more than one man, or a gang of men, is at work on lines controlled by a starter or switch, each party can be protected by its own lock until all of the work is completed and the men are out of danger.

Signs may do good service as a warning against danger or injury, but they do not always afford a positive safeguard. We have in mind an incident where a sign failed and a serious accident was the result. Repairs were necessary on a high tension line near the power house. The line man went into the power house and notified the engineer that he was ready to go out on the line and asked that the switch be thrown out. The engineer immediately pulled the switch and, in the presence of the line man, placed the sign "Hands off—Man on Line" on the switch. The line man then started out and began his repair work. While he was thus engaged the engineer thoughtlessly removed the sign and threw in the switch. Needless to say the line man was instantly killed. Had the line man locked the switch and taken the key with him this accident would have been averted.

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No. 277 ALL INDUSTRIES—THE LUKEWARM MANAGEMENT—HOW TO REACH IT.—I am acting upon the idea that other safety men have been up against the same proposition that I have. I therefore hope this simple way of approaching managers, superintendents or presidents may be the means of getting results.

There is something the matter with the executive heads of a company when you have to put the safety proposition up to them in dollars and cents, but nevertheless this must be done in some cases.

Human life and limb should be the first consideration in all cases, but unfortunately the mercenary side assumes gigantic proportions and this state of affairs must be remedied.

My method of getting results has been:

1. To investigate an accident and find out the cause of the injuries.

2. Figure what it will cost the company.

3. Figure what it costs the workman.

4. Tabulate the results, placing the cost to the company beside the cost to the employe as per the example shown.

Accident to .....F. Smith
Department .....AM 2.
Nature of Accident.....Loss of right eye.

LOSS TO COMPANY

Compensation	$750.00
Time on job	67.80
Breaking in of new man on job.	22.75
Total	$840.55

Total loss to company—One first-class

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machinist $???.?? The sum of $840.00.

LOSS TO EMPLOYE

One good eye	$???.??
Time off work, 2 weeks, Loss per week	22.00
New job pays less by 15 per cent. Earning loss weekly.	3.30

Remarks: This amount of money could easily have been saved to this company if this man had been given a chance by the executive heads of the company to protect himself.

Instructions should be issued by the executives of the company to all the men as per instructions furnished by the safety engineer. Obeying these rules will cut hospital bills and save large sums of money, as this one accident clearly shows.

Safety Engineer.

Invariably this kind of a report will get results, provided the man responsible will state absolute facts. Follow the same method with a few serious and semi-serious accidents and you will eventually *get* the executives of your company.

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No. 278 ALL INDUSTRIES—THE PREVENTION OF INDUSTRIAL ACCIDENTS.—There have been many different ways devised to prevent industrial accidents. Some of them have done much toward prevention, while others have been practically of no value. The old method of a safety engineer visiting a plant, hunting up defects, offering recommendations to overcome them, and then going away, reminds the writer of a grown person telling a baby how to walk and then leaving it to learn to balance itself. This method has been practiced by the casualty companies for some time, and, until recently, seemed the only way to overcome industrial accidents, so far as mechanical safeguards were concerned. Only about 30 to 40 per cent of the accidents happening in the mills and factories of our country today can be overcome by physical safeguards, leaving from 60 to 70 per cent to be overcome by education of the workmen; how to conduct themselves, refraining from careless and unnecessary customs and unsafe practices which endanger themselves and their fellow workers. The word *education* in safety covers a broad territory, and to accomplish and obtain the proper results we must all put our heads together and work with one accord. I find to accomplish the proper results in this work of education, the first thing to work for is co-operation. In entering a plant for the purpose of launching a safety campaign the first thing to do is to get in touch with the high officials, get them in line with you, and secure their co-operation. Then get in touch with the next class of officials—generally these are the superintendents—and get their co-operation. Then we go into the shop or factory and approach the foremen. These men I consider very important in a safety campaign, from the fact that if a foreman is a careful man and regards safety as he should, he has more influence with the men under him than any other official in the plant. Where you find a careful foreman the chances are that you will find several men who are patterning after him. He is the man who is continually with the workmen and he knows more about what goes on in the plant than any one else. Then we must get in touch with the workmen. Generally speaking, if you mix with the boys in overalls, become one of the "bunch," crack jokes, laugh and have a good time with them, tell them your business, and ask questions regarding safety, you secure a co-operation that you will not have if you pass them up and pay no attention to them. Get them all to put on their thinking caps and you have the fence let down for everyone, officials, superintendents, foremen and workmen, to walk right into a real safety campaign. You have aroused a feeling among them that makes every Man On The Job feel better, look better, act better, do better work, and more of it!

Then I find that the best way, according to my judgment, to eliminate accidents, get the plant put into good condition, and keep and maintain it, is to get a shop inspector appointed who is a practical man and understands the operation of each department. Then a general committee should be appointed to act on

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the inspector's suggestions and review his recommendations for changes and alterations in the plant and equipment. This committee should be composed of the higher officials of the company, so that when they approve of the inspector's recommendations, it means that they must be carried out and that some one has the authority to comply with them. After these heads are installed, then you are ready to make an inspection of the plant. Take the new inspector and proceed. Give him every possible idea of how to inspect and what to inspect. Don't keep anything from him that you know about inspection work. Probably you have had several years' experience and it is your duty to teach the man to be an expert if you expect your work to be of any consequence. While making this inspection it is well to stop and exchange a few words with various workmen, getting their views on certain things pertaining to their work. These little things get co-operation, which is one of the main features to be sought for. Point out every defect to the new inspector. Try to teach him where the danger lies in each defect, and why it should be overcome. This prepares him to answer any question that may be asked of him by the general committee regarding his recommendations.

After you have gotten the inspection end of the game started, the next step is to break into the educational end of it. A good method is through the safety bulletin. This offers a wonderful advantage in educating employes, but it cannot accomplish the whole thing unaided. The officials must talk safety to the men, the foremen must preach safety and practice what they preach. The safety engineer who launched the campaign must visit the plant and talk to the officials and also to the men. Keep the spirit awakened and don't leave it to any one person to keep the wheel turning. You will find in almost every plant what may be called a hard shell. He is usually an old mill man who has just about served his time out in the work. He never knew anything about safety and possibly hasn't a sound finger on his hands, but still he thinks safeguards are not worth fooling with. This type of a man has got to be labored with if ever you get him to wake up, but once awakened, he is one of the most useful men in the plant. He can give young men valuable information that he has been possibly 30 years in getting, through actual experience. I recall a case that came under my observation in a large planing mill a short time ago. I was asked by the manager to go into the mill and talk to the men, as he was interested in eliminating accidents. The first man I found was an old hard shell. I commenced to talk safety to him and he said, "To h—— with safety. I have been in planing mills all my life and I am alive yet." This man did not have a sound finger or thumb on either hand. I talked to him a while, but without any consolation. I told him I would bet him that before I got through with that plant he would change his mind. I went on to the next man, and so on. After a while the old fellow came following after me. He never said anything, but just kept following. I had the company build a good bulletin board for each department and sent them a liberal supply of safety bulletins. The next time I visited the plant they were posted. I went straight to the old hard shell and asked him if he had read the bulletins. He said he had and had quite a number of questions to ask me. I took some new bulletins with me on this trip and had them posted. The next time I visited the plant I noticed the old fellow standing looking at the bulletins. I walked up behind him, slapped him on the shoulder, and asked him what he thought of them. He turned around and said, "I have always had the wrong idea about this here safety business. I did not understand it like you fellows did. I believe it is a d——— good thing." He was running a tenoning machine, a chain mortiser and a boring machine. He said, "Come down here, I want to show you something." I went with him and I found that that man had done more in the way of safeguarding than any three of the other fellows in the shop. He could ask more questions than a lawyer and was the most interested man in the shop. He is getting to be an influential man among the other fellows, as to safeguards and the elimina-

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tion of what he calls horse-play accidents. He has been made guard builder, and is going to be in a short time appointed shop inspector. I was at the plant one day during the noon hour, and the old fellow entertained all of us telling of things he had seen happen in plants where he had worked. This kind of a man, in my opinion, is a shining light in a plant when it comes to safety campaigning. The safety engineer should never turn a man down because he puts up a fight against safety. He does not do it because he is right; he does it because he *thinks* he is right, and it is up to you, Mr. Engineer, to convince him that he is wrong. When you fire in on a man of this type and convince him that you are right and he is wrong, you have done more good than you could do in talking safety to several men who realized from the beginning that you were right and knew what you were talking about. Work the hardest on the man who does not want to co-operate with you. The other fellows will take care of themselves while you are working on the stubborn one. Another way to keep the spirit ever young is to have cards printed bearing safety cautions, such as, "Keep the guards on the machines and your fingers on your hands," "Safety first, last and always," "Carelessness is a short cut to the grave yard." Let the high officials go into the shop and give each man one card. This keeps the safety idea fresh in their minds. Such things as these cost but little and it is money well spent.

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No. 279 ALL INDUSTRIES—WHO AND WHAT IS A SAFETY ENGINEER—To be able to answer all the requirements of the safety engineer a man should be a good mixer, a mechanic, an engineer, a man of fair education, of good appearance, and a good talker. He should have some knowledge of the laws of the State in which he is working and know something of administering first aid to the injured. He must have the qualities of a teacher and be a total abstainer from "booze" while on the job. A safety engineer must be perfectly familiar with the compensation rating schedule and be able to tell a man in as few words as possible what he wants. He must be thoughtful and quick witted; slow to anger, with always a pleasant word for every one. He must appreciate the fact that the time of the man he is talking to is as valuable as his own.

He must be a man representing himself as exactly what he is, and no more. He must not try to pass himself for a college-bred man unless he is. The real safety engineer, in my estimation, is the man who has been reared in the mills, factories and workshops. The chances are that his English education is very limited, and if he does try to represent himself as a college man he may make some terrible blunder and then he is in an embarrassing situation. Probably the man he has been addressing will say, after he has gone, "That 'squirt' doesn't amount to very much, does he?"

The safety engineer must have an ability to impart in him so that he may deliver addresses to bodies of men, imparting to them what he has gained from, possibly, years of experience as The Man On The Job. The knowledge of safety engineering, no matter how perfect it may be, will do you no good unless you are able to give it to others in an educational way. We find these days that it is education which is making the home-run in safety and accident prevention; the matter of safeguards has stopped on second base.

My reasons for suggesting the foregoing requirements are as follows: In all probability there is not a point mentioned that some question will not be asked during his regular routine of work. A safety engineer should be able to give a questioner an intelligent answer in all cases. Safety is yet in its infancy, and there are men who would do much in the way of safety if they only knew how.

Go into a woodworking establishment. You find a jointer that the owner of the shop has realized is a dangerous machine. He has tried to guard it in the best way he knew how, but his guard is not efficient and you can see that it is not. You say to the man that his guard is not efficient and should be replaced by a better one. Don't you think it is your duty to tell him how to make an efficient guard

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or to tell him where he can buy one that is? This is expected of a safety engineer and I think it should be. It is a part of his business to be able to show or tell people about these things.

He must be a mechanic in order to look at a machine, whether he ever saw one like it before or not, and detect every possible defect about it, whether it is running or standing still. He should, at the same time, tell the owner how it can be guarded without interfering with the output, and be able to show him, if possible, how the guard can be made in his own shop. If this is not possible, he must tell him where he can buy a guard.

A safety engineer's education should enable him to speak intelligently to men with whom he comes in contact.

He should have a neat and gentlemanly appearance, but not go to extremes.

He should be familiar with the labor laws of the State in which he is employed, as in many instances it will enable him to secure better results in his work.

It is important that he understand administering first aid to the injured. If he doesn't, he is in an embarrassing position when it comes to checking up the first aid kit.

He should be a total abstainer while working, as no factory owner appreciates having a safety engineer come about him with the smell of liquor on his breath.

He should understand the industrial compensation rating schedule thoroughly, in order that he may be able to tell the owner of the shop what credit he will be allowed or what debit will be given him in cases of safeguarding.

He should be concise and able to tell just what he wants in as few words as possible. He must realize that another's time is as valuable as his own. Probably there is not time to carry on a long conversation on any subject, therefore he should keep close to the main subject and make every word count. With all the ups and downs of the safety engineer's career, the work is most interesting. It should interest every individual, and can be studied to advantage by all. There is nothing we do that does not require some safety move. If we are properly educated in safety we can see it more readily than those who are unenlightened in safety, and it is our duty to try and help them out of the old rut.

Let your knowledge of safety so shine that others may see your good work and join in the great campaign for safety.

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No. 280 VARIOUS INDUSTRIES—SUDDEN STARTING OF MOTORS.—In regard to sudden starting of motors, I think the author of the question has answered it in the asking. From my experience in machine shops as mechanic, and from watching others, and from my experience in accident prevention work the past nine years, I would say the only sure way is to lock the starting device and hand the key to the man most liable to be injured by the unexpected start. I would also place a warning sign at the locked device as a double safeguard. Human life is too precious to even consider a risk that would save only a few dollars or cents in lost time. If there is any way to accomplish the 100 per cent of safety to men engaged as mentioned, I should be just as anxious to cut out the unnecessary delays. Everything that is really worth while costs somebody something. The delays are the only problem I can see, as the method of locking is a matter of detail that can be solved. This may seem harsh and abrupt, but it is a decision after some deliberation and past experiences.

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No. 281 VARIOUS INDUSTRIES—EMERY AND GRINDING WHEELS AS USED IN THE AVERAGE MACHINE SHOP.—After investigating the number of accidents (and the cost of claims) due to emery or small pieces of steel or iron in the eye, it occurred to me that there must be something lacking in the respective machine shops, where employes are supposed to use goggles when sharpening tools or doing any grinding on emery wheels.

It is a fact that in most machine shops there are grinding wheels which cannot (practically) be provided with effective retaining hoods due to the variable kinds of grinding done on the side and top of the wheels. The employes should wear the goggles (which are provided by the

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employers; then accidents from emery and steel in the eye would diminish in a great proportion.

It is evident that the employe cannot always be depended upon to take down a pair of goggles, wipe them off, and place them in front of his eyes before doing a touch up tool sharpening job of one minute's duration.

There appears to be only one other remedy for the above mentioned condition, and that is to place a transparent isinglass in a sheet metal frame, or heavy plate glass, size 6x6 inches, directly in the vision line of the grinding wheel. This device, being at least 6 inches away from the wheel and permanently supported by metal support, allows the workman to handle and see his job at all times through the transparent glass, thereby having his eyes automatically protected, without depending upon him to think to use goggles when his whole mind is set on sharpening or grinding tools or other work in the regular course.

This device, used by request of the writer in numerous machine shops, has been found to be very effective.

Prizes for March Articles

First Prize. No. 268. James C. Neville, Inspector, New York & Queens Electric Light & Power Co., Long Island City.

Second Prize. No. 271. J. J. Heelan, Safety Inspector, Aetna Life Insurance Company, Chicago, Ill.

Honorable Mention. Earl B. Morgan, Safety Engineer, Norton Company, Worcester, Mass.

Other meritorious articles were contributed by A. H. Young, Director, American Museum of Safety, New York City; L. A. Beagle, Special Representative, Zurich General Accident & Liability Insurance Company, New York City; E. P. Elzy, Safety Inspector, Aetna Life Insurance Company, Hartford, Conn.; C. F. Pierce, Supervisor of Inspections, Aetna Life Insurance Company, Pittsburgh, Pa.; David S. Beyer, Mgr., Accident Prevention Department, Massachusetts Employes Insurance Association, Boston, Mass.

Comments by Members of the Committee

Number 275 gets my vote. There are many ways of preventing machinery being started while men are at work on shafting or other transmission. Many good suggestions are made in the March number of SAFETY ENGINEERING. Shop organizations are all different. In some a sign hung on the switch or starting device is sufficient. In some places locks are necessary and satisfactory. But the surest way of preventing the machinery being started while men are at work and of being sure it is started as soon as their work is complete is to station a man to guard the starting box. The writer shows plainly that he knows what he is talking about.

The system of keeping machinery from being started at the wrong time, described in article 271, is in my opinion absolutely reliable and no doubt could be put to use in a great number of cases where more than one man operates the machine.

In my opinion 270 is entitled to first prize for making a suggestion that will be applicable in all plants, regardless of size, where there is danger from starting motors suddenly.

I vote for 271 because I am familiar

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with the method he describes and can say that it is one of the most perfect equipments I have seen, being as near foolproof as it is possible, in my opinion, for human ingenuity to devise.

Article 268 sets forth just what we have been practicing and teaching in our company for the past three years. The kindly feeling spread among new men has acted like a charm in reducing accidents and cementing the structure into one harmonious whole.

In the March issue of SAFETY ENGINEERING I have read numerous ways for protecting motor driven machinery from being started while one is working on same. I think the best, surest and cheapest way would be either to remove the line fuses at the switch controlling the motor, tie same together and leave them with the party in charge, informing him at the same time where they came from; or, if it is a line controlled from a switchboard, hang a large tag with "Danger! Man working on this line" on the switch handle and report to the operator that you are to work on the line and that you will report when clear. However, I think a safe way would be to short circuit the line at the motor or at the switch controlling the motor.

My reason for choosing 268 is because I think that the foreman is the only one who can install a new man in his position. Doing so the foreman may not only save the man's life but he may save the life of a fellow workman. Also he may save trouble for his employer.

New Railroad Safety Device

THE Queen & Crescent railroad has lately equipped its route with a signal system, train and speed control. Practical tests have shown the device to be efficient. The system is entirely automatic. A train can be started under full head of steam, and will never collide with another, because the moment it enters a block occupied by another train, it is stopped by the application of the emergency brake. The device includes a caution signal which does not stop the train but slows it down to a predetermined speed and prevents the train from exceeding that speed. The speed control is a separate device which may be attached to any car of the train and can be set for any desired speed. Once set and in operation, the train cannot exceed the speed indicated.

Enthusiasm Is Impelling Force

L. G. BENTLEY, editor of the Chesapeake & Ohio Employes' Magazine, comments on the development of the safety movement. Although he admits that accidents have not been increasing in proportion to the business of the company, he asks for increasing attention to the work. "The all impelling force which may assure the success of the organization is enthusiasm." The railroads of the country which have made a conspicuous success of the safety movement are those in which some official devotes all his time to the work. This official should be an enthusiast, the heart of the movement. Then "if an employe is sufficiently interested to make a suggestion for the betterment of the service his intent alone is sufficiently commendable to merit the careful attention and courteous response of his superior officer." Mr. Bentley's magazine carries each month a record of all suggestions made by employes with a report on the action taken by the authorities.

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Team Work in Practical Service to Humanity

By H. W. Forster

Chief Engineer, Independence Inspection Bureau, Philadelphia

FOR over half a century progressive property owners and employers have striven to safeguard life and property against fire. The very decided success that attended the efforts of individuals in the fire prevention field, coupled with the tremendous need of bringing to the nation as a whole a constructive fire prevention gospel, resulted, twenty years ago, in the formation of the National Fire Protection Association. The N. F. P. A., as it is universally known, through its large and representative membership, is fighting with ever-increasing success to safeguard life and property against fire. It is our original national safety organization.

A single decade covers practically all the systematic safety work (other than fire prevention) that has been conducted in this country. The results of accident prevention efforts were so decided and gratifying, and the need of extending such activities so great, that the National Safety Council was called into existence to bring to the country as a whole the gospel of safeguarding life and limb (and incidentally property) against accidents in industry, in transportation, and in homes. The phenomenal growth of the Council, as it is known to thousands, is testifying to the need of such an organization and to its splendid service.

The elements of success of both associations have been practical service to humanity, large and steadily increasing numbers of members that have made funds available, and willingness on the part of the ablest men in both fields to give freely of their time and money to help put forward the causes they love. It is inconceivable that both organizations will fail to render increasingly valuable service to their members and to the country at large.

Under present international conditions it is not inappropriate to point out the great conservation of men and materials which has resulted from the activities of these two associations, a conservation that is essential to the successful waging of war. Both associations may properly be termed important agencies of national safety.

The N. F. P. A. and the Council are interlocked through their executive committees, their joint pushing of October 9th as National Fire and Accident Prevention Day, and committees such as the Safety to Life Committee of the N. F. P. A. and the Fire Prevention Committee of the Council.

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While each association has a big and specific problem of its own, each takes a keen interest in the work of the other, assists all it can, and delights in the growth of the other in usefulness and membership.

To men who are interested in or responsible for furthering safety in plants and properties of various kinds the relation of fire prevention to accident prevention is well known. Except in cases of arson all fires are accidents. The same ignorance, carelessness, and reprehensible disregard of the rights of others that are responsible for a large majority of our accidents underlie most of our fire causes as well.

As the causes of our fires and accidents are largely the same so also are the remedies, as is indicated in the following paragraphs:

1. Proper building construction plays a vital part in fire prevention. To a lesser extent, but by no means unimportant degree, this is also true of accident prevention. Ability to carry floor or other loads safely, to give safe access to high points, to provide proper clearances where railroad tracks enter, men walk under platforms or apparatus, or cranes run under building roofs, and to make safe window washing possible, are typical examples.

2. Safeguarding equipment plays an important role in both divisions of safety. Fire fighting, alarm, and egress facilities are similar in principle to machinery safeguards, ventilation systems, and adequate lighting. They are inanimate aids to safety. Unfortunately it is not possible to protect man against accidental injury with an equivalent of the automatic sprinkler system that so effectively safeguards life against fire dangers.

3. Manufacturing processes in every industry will bear scrutiny to determine if safer and just as efficient methods may not be substituted for those in use. Segregation of fire hazards, such as picker rooms in cotton mills, is comparable to putting a dust producing and health jeopardizing operation such as sand blasting where it will expose the smallest possible number of persons.

4. When being careful has become second nature to the working forces of a plant, the most important and difficult phase of the safety problem has been solved. To acquire the proper attitude requires an understanding of the fact that the people directly and indirectly bear the burdens of fires and accidents, of the causes of fires and accidents, and of the wonderful possibilities that lie in the prevention field. Practically everything that is done to further fire prevention helps accident prevention and vice versa. Brief consideration of the good housekeeping problem from both points of view will emphasize this point.

No plant or property that claims to be progressive can afford not to pay systematic attention both to fire prevention and to accident prevention. No plant that desires to secure the maximum results from its safety work can afford to permit either activity to proceed without co-ordination with the other. The purpose of this article has been to lead up to the preceding sentence in such a manner that the readers who have plants where co-ordination does not exist will be moved to secure it.

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Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all lines of industry to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

Safety Exposition 1917

THE two most important events each year in the industrial safety world are the Safety Congress of the National Safety Council and the National Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety. This year these two big events are to take place in New York City, and, through the co-operation of the National Safety Council and the American Museum of Safety, the National Exposition of Safety and Sanitation is to be held under their conjoint auspices.

The 1917 National Exposition of Safety and Sanitation will be far more valuable than any previous one. Every man engaged in, interested in, or who should be interested in, the protection of life and property against accident and fire should make every attempt to attend the Safety Congress and visit the Safety Exposition. Here will be gathered industrial safety officials from all parts of the country, who stand at the head of this great movement. Every man engaged in industrial safety can have the opportunity of meeting well known safety men and exchanging ideas with safety officials in his own line of industry and in a great many other lines of industry, for there will be present representatives from almost every recognized industry in America. In no other manner can a man obtain so much practical safety knowledge as by attending the National Safety Congress and visiting the Exposition of Safety.

Every company should send its safety man, or several safety men, for it will prove an excellent investment. It will afford an opportunity to acquire knowledge from the leaders. The exhibition of practical means for safeguarding life and property will give visitors the opportunity to carefully study what is needed in the way of safety devices and equipment. It is invariably the universal opinion, expressed after each convention, that attendance has been a splendid investment and well worth while.

The 1917 Congress will be far larger than any previous one. The National Safety Council reports that it is securing new members at the rate of 200 a month and it is estimated that at least 3,000 will attend this congress—a great increase over any former one. Now is the time to make plans for September 10 to 15. Manufacturers of devices needed for the protection of life and property should engage space now as the Exposition management advises that there is a greater demand for space this year than for any previous Safety Exposition.

Those who intend attending this convention should make their reservations and so be sure of securing accommodations. Every member of the National Safety Council should call the Safety Congress and Safety Exposition to the attention of his employers, friends and safety officials. By doing that he will aid in spreading the gospel of "Safety First."

Anatomical Accident Record

ACCIDENTS in all of the plants of the Corn Products Refining Company in 1916, classified anatomically, were as follows:

	Number Accidents.	Per Cent.
Fingers	1,148	43.21
Hands	305	11.52
Arms	262	9.81
Eyes	183	6.96
Legs	139	5.20
Thumbs	129	4.46
Feet	102	3.69
Head	98	3.78
Face	78	2.92
Toes	65	2.44
Body	56	2.09
Back	31	1.26
Shoulders	24	0.83

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Ribs	18	0.67
Hips	14	0.53
Ears	9	0.34
Neck	7	0.26
Teeth	1	0.03
Total	2,669	100.00

Safety Meeting in Paterson

THE American Locotive Company has set a good example in showing how the gospel of "Safety First" may be preached effectively in any industrial community. The safety first entertainment committee of the Cooke Works arranged a "Safety First" meeting in the Y. M. C. A. Auditorium, Paterson, N. J., recently and included in the program musical selections and safety motion pictures. There was an address by Edward C. Fisher, manager of the Cooke Works, and a talk on "Safety First" by Charles T. Banks, safety supervisor, Erie Railroad Company. Enterprising industrial safety officials will note the opportunity the Y. M. C. A. presents for arousing interest in safety by arranging meetings such as the one successfully carried out by the Cooke Works of the American Locomotive Company.

Again the Deadly Housefly

THE Merchants' Association of New York has issued a special bulletin calling attention to the dangers which may be transmitted by the ordinary housefly. It is known definitely that the fly is a "carrier" of typhoid fever germs, and several authorities have advanced the belief that it is also the "carrier" of the germ or virus of infantile paralysis.

The leaflet contains suggestions and recipes for exterminating flies. The United States Government reports that formaldehyde and sodium salicylate are the most effective fly poisons. They are convenient to handle and their preparation is simple. A further recommendation is that they are not poisonous to children. The bulletin further states that "any odor pleasing to man is offensive to the fly and vice versa." Oil of lavender diluted with an equal quantity of water and sprayed around a room is said to be effective in driving out flies.

Borax is recommended for use around stables and barns and out-of-doors, while any disinfectant such as lye, chloride of lime, copperas (sulphate of iron) dissolved in water, or crude carbolic acid, may be used in vaults.

Company Medical Service

ONE large manufacturing corporation notes with satisfaction in its plant journal that employes are using the company hospital and medical service in increasing numbers. To help the good work along it publishes extracts from the United States public health bulletins and advocates governmental health insurance based on preventive measures.

Connecticut Automobile Road

THE engineers of the new State automobile road along Little River in Connecticut have taken pains to make the road as safe as possible. The Connecticut law allows automobilists on this road to travel as fast as they care to, except that they must have 200 feet clear stretch of road before them when traveling fast. The engineers have "tip-tilted" the roadbed at the turns and curves so that a car may speed without danger of slide slip.

Injuries by Flying Nails

REPORTS of men injured by nails flying when struck by a hammer appear frequently. This trouble can be obviated to a large extent by the use of proper tools with scored or roughened faces. The riveting hammer was not intended for carpentry and should not be used to drive nails.

Dangerous Indelible Pencils

A BOY in Chicago was sharpening indelible pencils some time ago. Some dust from one of them got into his eye and he lost his sight. Twelve rabbits were similarly treated as an experiment. One recovered, one died, and ten lost an eye. The moral is be careful when sharpening indelible pencils, and never put one in your mouth.

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Technical Preparedness Census

AT the request of the Council of National Defense, the Bureau of Mines has undertaken a census of mining engineers, metallurgists and chemists, with the view of ascertaining the qualifications of each and the line of work in which each could be of most service to the country in time of emergency. The work is being conducted in co-operation with the American Institute of Mining Engineers, and the American Chemical Society. Circular letters are being sent to about 10,000 chemists who are members of the American Chemical Society and 5,000 to mining engineers and metallurgists who are members of the American Institute of Mining Engineers.

While there are a large number of mining engineers and chemists who are not members of either of these societies, an effort will be made to obtain as complete a list of these as possible. This will be done by circularizing 4,500 metal-mine operators and 4,000 coal-mine operators, asking that they furnish the names of mining engineers, chemists, and metallurgists in their employ. These names will be checked against the list of the two societies named and those whose names do not appear as members of the societies will be sent a special letter asking that they furnish the bureau with a record of their experience.

The results to be obtained by this census may be briefly stated as follows: It will make available for use a classified list of chemists, mining engineers, and metallurgists. The classification will embrace 27 specific groups of industrial chemists, as explosives, sanitation, foods, dye-stuffs, coal, petroleum, fats and soap, sugar, etc. The mining engineers will be divided into 16 groups of engineering work, as for example: Engineers familiar with machinery construction, building construction, dredging, drainage and pumping, underground mining, shaft sinking under compressed air, etc. The classification of metallurgists will embrace 15 groups, as for example, alloys, chromium and manganese, copper, lead, iron and steel, zinc and other subdivisions.

By such a minute classification, the bureau will be in a position to furnish on short notice the names of specialists; as for example, alloy metallurgists, food chemists, coal or iron mining engineers, or specialists in any branch of the mineral industry, so that in case of necessity these technical men could be placed in industrial plants where they would be of most assistance to the country. Experience in foreign countries has shown that the technical men were able to render vastly greater assistance by being placed in the factories than in the regular army.

In addition to the technical classification, there will also be a classification of engineers, metallurgists and chemists, according to their experience in foreign countries and languages with which they are familiar.

It is hoped that as a patriotic duty each engineer, metallurgist, and chemist receiving these cards will furnish the information promptly in order that the bureau may complete its work with the least possible delay. Complying with these requests in no way obligates the person who signs it, but has the advantage that in case of need he can be placed where his efforts will yield the best results. Chemists, engineers, and metallurgists are indispensable in any present-day warfare, and their services must be conserved to the best interests of the nation.

Cards calling for specific qualifications of technical men are being mailed to all whose names are available to the bureau. Any one who does not receive a card may obtain one by addressing a letter to the Director of the Bureau of Mines, Washington, D. C.

Uniform Traffic Law for New York State

AN important piece of legislation to be written soon on the statute books of New York State is the Welsh uniform traffic act, which has been reported favorably by the Assembly committee on internal affairs. All existing rules of the road in common use, although not fixed by law, are codified. These include directions

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for turning at corners around the center of the street intersection, "keeping to the right," crossing streets to the left so as to head into the general direction of traffic, stopping vehicles within seven feet of a standing surface car, etc. Some regulations of the Welsh law: Drivers of vehicles about to be passed by another vehicle going in the same direction shall draw out to the right at a signal, or give a signal if safe passage is impossible. Slow-moving vehicles must keep to the side of the road. Vehicles emerging from an alley, or stable or garage must give proper warning and be under control to avoid accidents. Mechanical signals or signals by hand should indicate when a driver intends turning to the left or right, or slowing down or stopping. Drivers are required to insure against the starting of their vehicles by other persons when they are left standing, and against failure of brakes when a vehicle is stopped on a hill by leaving it against the curb. Vehicles loaded with material extending beyond the rear shall carry a red flag by day or a red light by night. Street cars are given the right between cross streets over all other vehicles. Motorcycles and bicycles are forbidden on sidewalks or footpaths intended for pedestrians. Hand grips and foot rests are required on two-wheeled motorcycles and on bicycles when a second person is carried on a seat securely fastened to the rear of the machine.

Inspection of Fire Apparatus

THE Factory Insurance Association has issued a circular letter containing recommendations of what should be done in the spring in the care of fire apparatus. The suggestions include the examination and cleaning of all pipes and sprinklers before turning on the water, repairs of all leaks, and the testing of hydrants and pumps. The association urges the adoption of the dry pipe system for buildings where the water is likely to freeze, thus guarding against damage to apparatus and property and furnishing constant protection for property owners and the insurance companies.

Underwriters' Electrical Council

UNDERWRITERS' Laboratories announces the appointment of an electrical council to supervise the work of its electrical department. This work has heretofore been covered by the fire council of the Laboratories, but the work has grown so in volume and importance that it has been judged necessary to appoint a special council for this branch. The initial meeting of the Electrical Council was held at the Machinery Club, New York City, on the evening of March 28. The members of the electrical council are as follows:

Active Members. — L. A. Barley, electrical inspector, Rocky Mountain Fire Unds. Assn., Denver, Colo.; R. C. Bird, inspector, Fire Unds. Elec. Bureau, New York, N. Y.; W. S. Boyd, electrical inspector, The Union, Chicago, Ill.; G. E. Bruen, superintendent electrical department, Suburban Fire Insurance Exchange, New York, N. Y.; W. J. Canada, U. S. Bureau of Standards, Washington, D. C.; B. W. Clark, electrical inspector, Public Lighting Commission, Detroit, Mich.; H. H. Clark, electrical engineer, Experiment Station, Bureau of Mines, Pittsburgh, Pa.; James Cole, commissioner of wires, Boston, Mass.; W. Devereux, chief, electrical department, Philadelphia Fire Unds. Assn., 141 So. Fourth street, Philadelphia; J. C. Forsyth, electrical inspector, New York Board of Fire Underwriters, New York, N. Y.; B. H. Glover, associate engineer, Underwriters' Laboratories, Chicago, Ill.; C. H. Hill, chief electrical inspector, Unds. Assn. of the Middle Dept., Philadelphia, Pa.; M. F. Jones, chief electrical inspector, New England Bureau of United Inspection, Boston, Mass.; C. E. Lum, National Board of Fire Underwriters, New York, N. Y.; W. D. Matthews, superintendent of inspections, Chicago Board of Underwriters, Chicago, Ill.; A. H. Miner, Jr., electrical engineer, Underwriters' Bureau of New England, Boston, Mass.; C. W. Mitchell, inspecting engineer, Board of Fire Unds. of the Pacific, San Francisco, Cal.; I. Osgood, chief engineer, Boston Board

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of Fire Underwriters, Boston, Mass.; A. M. Paddon, engineer, Underwriters' Assn. of New York State, Syracuse, N. Y.; Dana Pierce, vice-president, Unds. Labs., New York, N. Y.; A. M. Schoen, chief engineer, S. E. Unds. Assn., Atlanta, Ga.; H. F. Strickland, chief electrical inspector, Electrical Inspection Dept., Hydro-Electric Power Commission of Ontario, Toronto; R. P. Strong, chief electrical inspector, Louisiana Fire Prevention Bureau, New Orleans, La.; Ralph Sweetland, engineer-in-charge, New England Insurance Exchange, Boston, Mass.; Victor H. Tousley, chief electrical inspector, Municipal Dept., Chicago, Ill.; A. G. Wilbor, Factory Insurance Assn., Hartford, Conn.; H. S. Wynkoop, electrical engineer, Bureau of Electrical Inspection, New York, N. Y.

Corresponding Members.—H. M. Beecher, chief inspector, Dept. of Electricity, Los Angeles, Cal.; F. A. Cambridge, city electrician, Winnipeg, Man.; M. E. Cheney, electrical engineer, Washington Surveying & Rating Bureau, Seattle, Wash.; R. L. Daniel, engineer, General Inspection Co., Minneapolis, Minn.; F. O. Everts, electrical inspector, Ohio Inspection Bureau, Columbus, Ohio; J. H. Fenton, electrical inspector, St. Louis Fire Prevention Bureau, St. Louis, Mo.; Oscar M. Frykman, chief electrical inspector, Building Dept., Minneapolis, Minn.; Warren Hadley, electrical engineer, of District of Columbia, Washington; C. R. Hodgdon, chief electrical inspector, Allegheny County Board of Fire Unds., Pittsburgh, Pa.; W. B. Hubbell, chief electrical inspector, Cincinnati Fire Prevention Bureau, Cincinnati, Ohio; F. H. Moore, chief inspector, City Electrical Dept., Indiana Inspection Bureau, Indianapolis, Ind.; J. R. Morrissey, superintendent electrical dept., Wisconsin Inspection Bureau, Milwaukee, Wis.; Wm. Lincoln Smith, secretary National Assn. of Electrical Inspectors, Concord, Mass.; H. H. Sutton, chief electrical inspector, State Insurance Commission, Austin, Tex.; C. M. Tait, chief electrical inspector, Canadian Fire Unds. Assn., Montreal, Que.; E. W. Trafford, city electrician, Richmond, Va.; F. D. Varnum, city electrical inspector, St. Paul, Minn.; H. G. Veit, chief electrical inspector, Cleveland Inspection Bureau, Cleveland, Ohio; F. D. Weber, electrical inspector, Underwriters' Equitable Rating Bureau, Portland, Oregon.

Powder Ignition Kills Nine

NINE girls dead and more than a dozen others injured were the result of an explosion in the plant of the Detwiller & Street Fireworks Manufacturing Company, Jersey City, April 4. The company is engaged in the manufacture of munitions for the Russian Government, and it is said that 50 young women were bending over a long wooden table, pouring black gunpowder into priming caps. It is the belief of the authorities that one of the girls, sliding a wooden powder tray along the table which was piled high with the powder, happened to strike a nail in the tray against a nail in the table, producing a spark. Instantly blue flames darted the full length of the long table, singeing the eyebrows and hair of the girls, blistering faces and hands and igniting their clothing before they could move away. During the mad rush for the four doors and closed windows of the room, powder cans and magazines were overturned, and before anyone could reach safety, the one-story brick building was filled with fire and smoke. E. J. Bingle, president of the company, Robert Brown, plant manager, and Paul Koski, inspector of munitions for the Russian Government, rushed into the building and dragged out the victims, many of them unconscious and with their clothes burned off from the waist up. In all, 19 women and 1 man were so badly burned that they were taken to various hospitals. Of these four women died the next day and 5 others subsequently. Others less seriously injured were able to go to their homes. There was no explosion according to occupants of the room and the building itself was practically undamaged.

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An explosion occurred in the Detwiller & Street plant in October, 1914, in which 6 persons were supposed to have been killed. Only 3 bodies were found and it was believed that the others had been literally blown to pieces. The authorities demanded at that time that the company give up manufacturing dangerous articles and it was said that the officials agreed to do so. The Detwiller & Street Company has since been merged with the Unexcelled Fireworks Company of New York, with offices in the Woolworth building. An official of the company stated after the accident that the manufacture of priming caps, the company's sole output at this time, was not thought to be very dangerous in itself, though wherever there is gunpowder there must always be danger.

Mining Engineers' Safety Rules

AT the February meeting of the American Institute of Mining Engineers, held in New York City, "Safety First" was the subject of a number of papers presented. In the interest of securing a standardized and more efficient application of the principles of "Safety First" the committee on safety and sanitation made the following suggestions:

Make it clear to all that the management is doing this work for the good of the workmen and their families.

Have no rules that are not enforced.

Do not depend too much on rules and regulations but remove the danger wherever it is practical to do so.

Those administering safety orders must see that they are carried out. A boss ordering a dangerous roof taken down, or merely a nail driven flush, should not leave until his instructions are obeyed.

No possibility of conflict of authority should exist.

No intoxication should be tolerated and should be condemned by fellow workmen as well as by the management.

An educational campaign is absolutely essential.

Every injury, no matter how slight, should be recorded and medical attention or first aid given by competent persons.

Any boss discovering an injury to any of his men which has not been reported should inquire as to its cause and reprimand failure to report such injury.

Medical classification of all men employed should be made.

Fooling and wrestling should be strictly prohibited as many accidents are caused in this manner.

Engage only sober, careful and reliable men.

Fire Waste 1916 $231,442,995

THE chief reason for this appalling waste is that the people choose to be careless—in their homes, disregarding the hazards of untidy basements, neglected furnaces, unsafe lighting devices, etc.—in their factories, leaving fire doors blocked open, permitting obvious structural defects to remain unremedied and in a hundred ways demonstrating their contempt for the fire hazards of industry—as citizens, taking no interest in the enactment or enforcement of laws that would reduce the fire waste—as individuals, cheerfully scattering lighted matches and cigar and cigarette stubs on every hand.

To correct these bad habits is a big job. The National Fire Protection Association has, however, set out to achieve this result.

Street Accidents in New York

TWENTY-FIVE persons were killed by automobiles in the streets of New York City during March, according to figures compiled by the National Highways Protective Society; 4 were killed by trolleys and 8 by wagons. During March, 1916, 22 were killed by automobiles, 6 by trolley cars and one by a wagon.

During the first quarter of the year 102 persons have been killed by vehicles in New York City, of whom 61 were killed by automobiles, 26 by cars and 15 by wagons. In New York State, outside the city, 16 persons were killed

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during March by automobiles, two by trolley cars and one by a wagon.

Magistrate Frederick B. House, presiding over the Traffic Court, has made public his first statistics on speed violations. From June 14, 1916, when the court was opened, until December 29 last, he heard 2,746 speed cases. Of these 673 were caught on Fifth avenue, and of the 673, 222 were caught between Washington Square and Twenty-third street, 63 between Twenty-third and Forty-second streets, 331 between Fifty-ninth and 110th streets. Riverside Drive provided 439 violators and Broadway furnished 313.

Mine Rescue Pioneer

WILLIAM A. RAUDENBUSH, formerly a foreman miner of the Bureau of Mines, died at Harrisburg, Pa., on February 11, 1917, after an extended illness. Raudenbush was one of the pioneer rescue men of the bureau, a man of initiative and daring. He attended many serious disasters, was often placed in charge of crews and led the work of rescue with the spirit of a fearless, brave man. He was with the bureau in its most trying days when the life-saving work was new and strange to operator and miner. Under difficult circumstances, with the suspicion that usually surrounds the beginning of new movements, Raudenbush not only acted his part as a rescue man, but also conducted himself in a manner that brought credit to the bureau. It is with deep sorrow that the bureau witnesses the passing of this hero, who did so much for it in those trying pioneer days.

Rochester's Complaint Bureau

THE Safety Council of the Rochester chamber of commerce opened its "Safety First" campaign with a public safety week beginning April 2. The program included meetings at which motion pictures, addresses and music were the features. The chief object of the meetings was to promote a plan for opening a complaint bureau under the auspices of the Safety Council. The object of the bureau is to ask violators of Rochester's traffic ordinance to be more careful. Complaint cards will be distributed throughout the city, public shows will be held and other effective means will be devised to popularize the bureau and induce the public to report names, license numbers, etc., in cases of dangerous traffic violations. Upon receipt of a complaint, the bureau will send the offending automobilist, motorman, driver, jaywalker, whoever he may be, a courteous letter, urging consideration for his own life and the safety of others. A fourth offense by the same person will be referred to the police department for its action. At present, citizens hesitate to inform the authorities of violations of traffic laws, fearing that they may be called as witnesses or embarrassed by the use of their names. The bureau will act as confidential agent for those sending in reports and will withhold all names.

New York's New Boiler Code

THE committee which has been at work since last fall on the proposed new boiler rules of the industrial code of the State of New York has completed its task. The tentative rules governing the installation, construction, inspection and maintenance of high pressure boilers were taken intact from the code of the American Mechanical Engineers, but the regulations pertaining to low pressure boilers were materially revised. Liberal use was made of the "Boiler Safety Orders" issued by the Industrial Accident Commission of California, which, with a few changes, seemed well suited to the conditions of New York State. Hearings of the tentative code were held in the principal cities of the State, and suggestions were invited from employers, employes and the general public. As soon as the code is approved by the State industrial commission, according to the law, it will be advertised for 10 days in newspapers of the State. It will then be revised and corrected once more, after

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which it will again be passed upon by the commission. When finally approved by the industrial commission, it will have the full force and effect of law.

New Safety Gates for Railroads

THE American Railway Association is setting a new style for safety gates at grade crossings. From now on they will be striped in broad bands of black and white, painted diagonally. This permits them to be seen nearly twice as far as the old style white gate, and will, without doubt, be the means of materially lessening the death toll at grade crossings. Railroads all over the country are following the example of the eastern railroads in this respect and many of them are also adopting the round target hand signal in place of the old-fashioned flag. The target signal is ordinarily made in the form of a 16-inch white disk with the word "Stop" in large black letters. Few motorists fail to catch the meaning and usually bring their cars to a quick stop instead of trying to beat the train. In one middle-western State, in 1915, there were 95 deaths and 241 injuries at grade crossings. The figures for 1916 have not been completed, but it is known that there were more than 100 fatalities in the same State. As there will be a larger number of automobiles than ever this spring, the importance of the new safety movement is obvious. A "joy-rider" can continue to flirt with death at the grade crossings, but the excuse that he did not see the white bars of the safety gates will lack the conviction which has heretofore caused sympathetic juries to award heavy damages.

"Safety First" Week in Los Angeles

UNDER the auspices of the Ad Club of Los Angeles, a "Safety First" week was conducted, beginning March 24. In promoting the plan, W. R. Humphries, president and field manager of the Safety First Association of California, at a weekly luncheon of the Ad Club, said: "The plan is to make the people think about 'Safety First,' and in doing this we will have the co-operation of the school children, social and religious organizations, street car companies and automobile owners. One of the first steps will be to distribute 10,000 cards to school children, and on these the 10 commandments of 'Safety First' will be printed. To this card another will be attached which will instruct the parents in fire prevention.

"In Oakland we were given effective support by the Boy Scouts. In Los Angeles, where traffic is congested, the need of such a campaign is urgent. One cannot say to what extent accidents can be decreased here, but in Oakland the vehicular and pedestrian accidents were decreased by about 40 per cent."

Railroad Men Hurt— Lack of Care

A RAILROAD employe is injured in the United States every 16 seconds, according to Isaiah Hale, safety commissioner of the Atchison, Topeka & Santa Fe Railway. Every 15 minutes an American railroad man is killed. In his safety lectures, delivered in cities and towns along the line of the Santa Fe system, Mr. Hale uses an electric "scoreboard," on which an electric light is flashed every 16 seconds, and every 15 minutes a gong is sounded, thus reminding the audience of the terrible toll in injury and death the railroad business takes. Mr. Hale asserts that 90 per cent of the deaths are due to carelessness and 30 to 40 per cent of the loss of life is due to disobedience of orders.

Safety Work in Small Plants

JOHN A. MURKIN, safety expert of Nashville, Tenn., urges the organization of "Safety First" councils or committees especially in small plants, employing 100 people or less. A safety organization which will work effectively in a single department of a large plant will work equally well in a small plant with the same number of employes. The work can be carried on just as it is in the larger concerns—workmen's inspection committees which make monthly written reports

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to the superintendent, bulletin boards, etc. The reward of "Safety First" is the good fortune of being able to live without any unnecessary suffering, scars or other disfigurement. Every one can be careful and being careful is being safe. Mr. Murkin is now at work on a 30-page safety bulletin which should be of interest and value to every man, woman and child in the city of Nashville, and elsewhere.

A Safety Propaganda in Chicago

AN effective means of propaganda for the safety movement was devised and has been put into effect by William Burgess, executive secretary of the Public Safety Commission of Chicago, in co-operation with Louis N. Hammerling, proprietor of the American *Leader,* the national organ of the foreign language newspaper publishers of the country. Mr. Burgess prepared several articles on safety which were printed in the *Leader* with the request that editors reproduce as much of the material as possible. Many of the newspapers translated the articles in whole or in part and thus carried the safety creed to a large group of workers which the usual media never reach.

"Safety First" on the Lackawanna

THE figures showing that 48 employes were killed and 2,441 injured during 1916 on the Lackawanna railroad do not speak much for the "Safety First" agitation as it applies to the men working for that company. However, when one considers the propensities of the Lackawanna to run long trains it seems remarkable that accidents are so few. The Delaware & Hudson railroad runs short trains, as a rule, with smaller engines. A 25-car coal train on the D. & H. has a crew of 6 men. It is said that the profit-producing Lackawanna, with its huge engines, will run trains of 40 to 50 cars with the same crew of 6 men. The coal cars hold from 40 to 50 tons each, and the work of looking after the trains is killing to the small crew. The coal and freight trains use "pusher" engines on the rear of the trains on the steep grades of the Lackawanna, and now and then an instance of "buckling" is reported. Of course many trains can "buckle" and the crews can escape, but it is not a safe amusement. Long trains with small crews enable a railroad to make big profits, but is "Safety First" promoted by sending such trains over the steep grades of the Pocono mountains? Two 25-car trains with a crew of six to each train might not allow the Lackawanna to "cut a melon" so frequently, but does any one believe that the system would not be safer?

Care of Injured Persons

DR. C. A. RAY, of Leewood, Va., company surgeon for the Chesapeake & Ohio railway, advises the company to try to bring about the closest possible co-operation between the surgeons, the officials, and, particularly, the employes in speedy and effectual care of injured persons. He suggests that cases which have become serious owing to lack of, or improper, care be noted in the safety bulletins.

Old Employe Is Usually Safe

THE value to the service of the old experienced employe is commented on in a recent number of a railway safety bulletin. It bears particular stress on his influence on other employes. He is usually a safe man and knows how to avoid danger, and his example is frequently more valuable than many lectures. It is such men who form the mainstay of many safety locals and teach their co-workers to avoid loose sleeves around machinery, to wear goggles and other protective devices, to use care in operation of machines, and to shun a defective tool.

Both Men Were to Blame

A FOREMAN standing on one track of a double-track railroad line in the East was injured by a cinder which a fireman on an engine passing on the other track threw

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out. Both men were to blame. The foreman should have shown his men that safety lay in being far enough away from a passing train so that if anything rolled off it would not strike anyone. The fireman should have looked to see that the coast was clear before he threw out the cinder. Both realized this when it was too late.

C & O. Fire Insurance Inspector

WALTER S. GREENE has been appointed to the newly created position of fire insurance inspector of the Chesapeake & Ohio Railway Company, with headquarters at Newport News, Va. The Chesapeake & Ohio has been actively engaged in the safety movement for four years, and this new department, which will attempt to reduce fire losses, will be an active assistant. It speaks well for the spirit of the safety movement on the road that the reason assigned for the establishment of the new department was the number of fire prevention suggestions coming from employes.

Recover? Yes. But How Much?

AN economic reason for the development of "Safety First" on the railroads of the country is illustrated by a story told in one of the railway monthlies. "There had been an accident and one of the passengers was taken to the hospital in an unconscious condition. When he came to himself, the doctor and several nurses were at his bedside. 'Where am I? Have I been injured?' he asked. 'Yes,' replied the doctor, 'but cheer up, you will recover.' 'Sure I'll recover,' the patient groaned, 'but how much?'"

Discharging Careless Foremen

A COMPLAINT issued by one safety agent on an eastern road is that operating officials are loath to discharge the careless foreman, when his offense results only in the killing or maiming of one of his subordinates. "We reprimand and sometimes suspend a section foreman for allowing his handcar to be destroyed, but have never known of a section foreman being held to account when one of his laborers was killed because he did not observe our instructions to 'Keep clear of both tracks when a train is passing on either track.' Which is the more important in point of general utility, lasting value, and dividends, and which can be the more readily replaced? The machine or The Man?"

Good Safety Stories

THE Illinois Steel Company 's Safety Bulletin has a page of good stories in a recent number. Here are a few of the best:

BOTH SATISFED.—A man down in Missouri put his hand in a mule's mouth to see how many teeth the mule had. The mule closed his mouth to see how many fingers the man had, and the curiosity of both man and mule was satisfied.

WOULD DIG ONE FOR HIM.—A Mobile man tells of a negro truck driver who backed his truck into the space allotted to a rival concern at a railway freight depot in that town.

"Look out, niggah!" yelled the driver on whose territory the other had transgressed. "I'll knock yo' outer house and home ef yo' don't back up."

"I ain't got no home," retorted the offending driver. Now what yo' gonna do 'bout it?"

"I'll dig yo' one, niggah—I'll dig yo' one," was the response.

SAFETY FIRST.—An electric wire had fallen under its heavy weight of snow. The lineman found a crowd around the grounded copper and an inquisitive Irishman lifting one end from the ground. He said to the Irishman: "Man alive! Don't you know what a risk you are taking? That might be a live wire." "Sure," said Pat, "I did be thinkin' that meself and I felt of it before picking it up."

Anaconda's Safety Results

"YOU have no right to take a chance. The other fellow may have to take the consequences" is the slogan on the cover of the *Anode*, published by the Anaconda Copper Mining Company. It announces that R. S. Foster, safety engineer of the Butte Mines, has resigned his position to become safety engineer for the Doe Run Lead Company, at Flat River, Mo. He is succeeded by his former assistant, T.

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Oaas. The Anaconda Company prints a list of serious accidents for each month with the name of the foreman and the sub-foreman in charge of the work. In September, 1916, the 27 mines of the company operated without a fatal accident and with an average of seven-tenths of an accident in each 10,000 shifts. Seventeen of the mines had no accident incapacitating a man for more than 14 days.

Unsolved Safety Problems

"THE automobile and the skyscraper are commonly supposed to be the most efficient developments of the century, and yet they have made inefficient every commonwealth in America," said Darwin P. Kingsley, president of the Safety First Federation of America, in a recent address in which he complained that other achievements of mankind had not yet enabled it to adapt itself to the new conditions. He cited the example of Times Square in New York as an example of a problem which the skill, science and thought of the experts had been unable to handle efficiently.

Citizens Can Stop Lawlessness

A PARAGRAPH appears in the annual report of the Public Safety Commission of Chicago which would bear repetition in other cities where safety is being pushed. "A very intelligent citizen stepped into the office of this commission a few days ago, and reported a case of an automobile which, in driving on the wrong side of the street, had hit a boy, and apparently severely hurt him. This occurred within half a block of our office, and our visitor seemed surprised that we were not on the scene in some official way. 'Why,' said he, 'is not this the very object of this commission?' To which we replied, 'No! The work of this commission is to prevent lawless acts before the accidents occur. The poor boy who is hurt will have scores of helpers on the instant, and the police will take care of the lawless driver in such a case.' Our visitor confessed that this brought to him a new point of view. 'I might have noticed that man driving on the wrong side of the street,' he said, 'but would not have thought of reporting the circumstance had not the accident occurred.'"

Caution Labels for Films

THE National Association of the Motion Picture Industry, in considering the shipment of films through the express companies, advocated the plan of providing all express agents with the yellow "Caution" labels for film cases, so that a new label can be put on a case as soon as the old one shows signs of wear. This is planned to relieve the shipper of the bother and keep the agents properly warned. The committee on fire prevention of the association is planning to issue a booklet giving standard rules for fire prevention and theater regulation which will be urged on municipalities when changes in the fire laws and regulations are under consideration.

Sane Fourth of July

THE "Sane Fourth" idea has borne fruit, according to Gardner T. Swarts, Secretary of the Rhode Island State Board of Health. From 1903 to 1910 the Fourth of July casualties averaged: Dead, 207; injured, 4,483; total, 4,690. Since 1910 the averages have been: Dead, 38; injured, 1,007.

Sound the Whistle!

THE average locomotive engineer does not sound his whistle properly when approaching highway crossings, according to the *Railway Age Gazette*. Some engineers do not sound their whistle long enough or loud enough to provide an efficient warning. Others give long loud blasts that tend to confuse. "Any such thing as training the enginemen to observe the difference between one second and five seconds, or between heavy and light sounds seems never to have been thought of."

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Federal Safety Activities

THE United States Coast Guard saved fewer lives and less property in 1916 than in 1915. This was probably due to the decrease in coastwise shipping diverted to foreign service as the result of the war. The service saved the lives of 1,216 persons who would otherwise have perished. Other assistance was rendered to 15,742 persons. The property saved from immediate jeopardy was more than $10,000,000, or twice the cost of the service. The preventive work done by the Coast Guard includes the warning of 129 vessels running into danger, the piloting of vessels into safe places, and the destruction of 29 derelicts which were menacing navigation.

Marathon Safety Bulletin

THE Marathon Safety Bulletin, issued by the Marathon Paper Mills Company, Rothschild, Wis., is one of the brightest and newsiest of safety periodicals. During 1916 it was a bi-monthly, but the demand in the plant was for more numbers and it is a monthly this year. Remarks on "Co-operation," by A. H. McQuilken:

"If I can do no good for you
And you no good for me,
The world without us would go well
As far as I can see."

Alcohol Destroyed Building

IN unloading a car containing 5 oak barrels of alcohol and 70 oak barrels of spirits, relates the Bureau of Explosives, it was found that 60 barrels had been loaded on end on the floor, with 15 barrels on top of them. Two of the 15 barrels had holes in their staves caused by rolling against bolts in the end of the car. Fifteen or 20 of the 60 barrels on the floor had their staves pushed in, and part of their contents had leaked out. The interior of the car and the barrels were saturated with alcohol and spirits. The barrels were being rolled out on their bilge, and during unloading, more or less of the alcohol and spirits had leaked out on the freight house floor. After looking at the condition of the car the agent and house foreman turned to go into the next section when a sheet of flame burst from the car. The checker in charge of the gang claims that his first intimation of the trouble was when he discovered the fire on the floor of the car and floor of the freight house almost simultaneously. The fire that resulted destroyed the car and contents, about 9 carloads of other freight and partially consumed the freight house and contents. Estimated loss $35,000.

There was no flame or light of any description about the premises during the unloading of this car, and as the temperature was not above 40 deg. F. in the car and the freight house, it is not probable that inflammable vapor was formed. The most probable immediate source of the fire was from friction on impact of the steel hoops of the barrels against each other in unloading, or friction on impact with a crowbar or other metal implement used in unloading. The barrels are believed to have been wedged tightly together and the hoops may have struck fire while the employes were pulling them apart. The barrels, the floor of the car and the freight house being saturated with the leaking alcohol and spirits, a spark from some such source could have easily ignited the leakage. As the result of this fire, the city authorities arranged with the railroad for the delivery of future alcohol shipments from bulk delivery tracks so that barrels of alcohol will not hereafter be brought into proximity with the city freight house.

Getting Together for Safety

JOHN D. ROCKEFELLER, JR., says: "Every human being responds more quickly to love and sympathy than to the exercise of authority and the display of distrust. As the officers of our great corporations come to see more and more that the problem of understanding their employes and being understood by them is a vital problem, one of the most important with which the management is confronted, they will be convinced not only of the wisdom of devoting far more time

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to such contact, but of the desirability and the advantage to themselves, and to the employes as well as to the company, of such closer relation and intimate conference in regard to matters of common interest and concern. If we look into our own experience, we find that the misunderstandings which we have had with other men have been largely the result of lack of contact. We have not seen eye to eye. Men cannot sit around a table together for a few hours or several days perhaps, and talk about matters of common interest, with points of view however diverse, with whatever of misunderstanding and distrust, without coming to see that after all there is much of good in the worst of us and not so much of bad in most of us as the rest of us have sometimes assumed."

These observations are especially applicable to safety work. The safety habit is not inculcated by compulsory methods as thoroughly as by co-operative personal relations between employers and employes. A spirit of real fellowship is good at all times and in all ways.

Public School Instruction

PUBLIC school instruction in "Safety First" with particular emphasis on the dangers in crossing streets on the way to and from school, and the proper manner for avoiding them, was instituted in Bristol, Conn., schools recently. Superintendent of Schools Karl A. Reiche sent out notices to the teachers summarizing the information which was to be given out and requiring that they give a warning talk to their pupils.

Chartered Insurance Institute

THE "Journal" for 1916 of the Chartered Insurance Institute, printed by James Hedderwick & Sons, Limited, Glasgow, contains addresses delivered before various insurance institutes of Great Britain. Of interest to the fire preventionist are: "Tanning, Currying and Leather Dressing," by G. A. Burras of the Employers' Liability, Leeds, which contains a section devoted to tanneries as fire risks; "Soap Works," by Thomas A. Liley, of Joseph Watson & Sons, Ltd., Leeds, in which there is a chapter devoted to fire hazards of the soap-making industry. John Calder of the Canadian Fire Underwriters' Association contributes "The Fire Hazard of Grain Elevators." "Fire-Resisting Properties of Australian Hardwoods" is the title of a paper read by V. B. Trapp before the Insurance Institute of Victoria in July, 1915.

After-Care Clinics

IN all disabling ailments, says Dr. C. H. de la Chappelle in *American Industries*, the cases require after-treatment if the injured workman is to regain his health and working capacity. If neglected, these ailments necessitate a large expenditure of money in the form of "compensation."

Some of the most progressive insurance men have recently studied the methods in vogue on the European Continent, where employers' liability laws have been in force for more than 30 years and where the greatest minds have been at work to formulate a system of treatment to hasten the recovery of injured workmen and eliminate or reduce the long continued payments of disability compensation.

American inquirers reached the same conclusion as the Europeans had come to, that is to say, that this social and financial problem would be best handled by after-care clinics specially equipped to furnish to the injured workman adequate, comprehensive and skillful treatment.

Looking about them for the requisite essentials, the inquirers realized that these treatments were not to be had. We have physicians enough, but the main remedial resources consist of physical treatments, and as these are not taught at our medical schools our physicians as a class have no practical knowledge within this domain, although the efficiency and applicability of these treatments is readily admitted by everyone. The fact that a certain remedy is

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effective does not help the patient as long as the remedy cannot be had.

Accidents Decrease in Rochester

THE comparative table of public accidents, lately given out by Chief of Police Joseph M. Quigley of Rochester, N. Y., has three features worthy of special attention. First, in January and February of this year, there was a reduction of 65 per cent in the automobile accidents from those occurring during the corresponding months of 1916. There were 2 automobile fatalities last year as against none for the first 2 months of 1917. Second, the street car accidents for the same period show an increase of 40 per cent over those of 1916; but there were 3 fatalities last year and none this year. Third, the total number of all classes of public accidents for January and February, 1917, is 24 per cent less than the number during the same period of last year.

Figures for the whole of 1916 show a total of 954 public accidents, 48 of which were fatal. About 50 per cent, or 475, were automobile accidents with 21 fatalities. Street cars were the cause of 159 accidents and 10 fatalities. Others were: Horse drawn vehicles, 84 accidents, 5 deaths; motorcycles, 82 accidents, 1 death; bicycles, 57 accidents, no deaths; miscellaneous, 56 accidents and 5 fatalities.

Guard Rails on Highways

THE new Good Roads Year Book of the American Highway Association gives a warning of the need of paying more attention to the safety of travelers on roads. The growing popularity of automobiles has changed conditions in the last few years. If a motor car is forced off the hard road on soft shoulders even the most skillful driver sometimes loses control of his machine. Where ditches are deep or the road is on an embankment with steep slopes, there is real danger to occupants of the car. The records of the Iowa State Highway Commission show that during the last three months of 1916, in that State alone, 167 cars went over embankments, killing 7 persons and injuring 234. These figures show more clearly than any general argument the importance of providing substantial guard rails at such perilous places.

Wood Fireproofing Plants

FIREPROOFING the wood used in the construction of passenger cars has become quite a common practice in England. One of the largest fireproofing plants, which is similar to an American creosoting plant, is that of the London & Northwestern Railway. This plant has two 50-ft. cylinders, each 6 ft. 9 in. in diameter, equipped to treat 1,800,000 board feet of lumber annually.

At the annual meeting of the National Association of Cotton Manufacturers to be held in the Copley-Plaza Hotel, Boston, Mass., the afternoon session of April 25 will be devoted to a discussion of "Decay in Mill Roofs and Timbers," over which Mr. F. J. Hoxie will preside. Wood-preservers generally are invited to participate.

New Arson Law in Indiana

THE following law was passed in February, 1917: "Be it enacted by the General Assembly of the State of Indiana. That whoever willfully and maliciously prepares, places, arranges, sets or distributes any combustible material, explosive substance, instrument, liquid or other substance in or about any house, building or other structure; or any ship, vessel, steamboat or other water craft; or any lumber, agricultural products, railroad car, electric car, automobile, wagon or farm machinery; or any building materials, manufactured products or materials intended for manufacture, with the intent to set fire to or blow up or destroy any such property, it being the value of $20 or upwards, and being the property of another, or being insured against the loss or damage by fire, and such acts of preparing, arranging, setting or dis-

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tributing being done with intent to prejudice or defraud the insurer; and has not yet set fire to or blown up such combustible materials, explosive substance, instruments, liquids or other substances, so placed, arranged, set or distributed, is guilty of arson in the second degree, and on conviction shall be imprisoned in the State prison for not less than one year nor more than 8 years."

Firemen Running Elevators

THE Hotel Sinton, Cincinnati, has inaugurated a "Safety First" innovation by employing 9 retired city firemen as elevator operators. If a fire should occur in the hotel, these men, who have seen much actual service, will be relied upon to prevent a panic and handle the fire extinguishing apparatus belonging to the hotel.

The Cincinnati Fire Prevention Bureau has adopted a new plan to insure that all hose attached to standpipes in local theaters shall be in proper condition for use in case of fire. Each theater owner must provide two extra lengths of hose. Every week two lengths of the hose in service are replaced by the reserve lengths, thoroughly tested and hung in the fly to dry. The plan will insure that every piece of hose in Cincinnati theaters is tested at least once in every 7 weeks. Two men from the uniformed force of the fire department have been detailed for constant work in the theaters. These men test theatrical scenery and place an O. K. label on every piece in satisfactory condition.

Safety Men Are Life Savers

THE alert, muscular beach guard is not the only life saver who is constantly exercising self sacrifice, according to the *Manitowoc Safeguard*. Safety work calls for self sacrifice. You must be constantly on the watch to help others—you must be a life saver. Start the battle now. Remember that every man who thinks and acts safety is a life saver—and it's a noble work.

Sprinklers Are Not Foolproof

AUTOMATIC sprinklers are not foolproof and most of the serious sprinkler losses are due to the human hazard. This is present in all risks, whether insured in stock companies or mutuals. The claim of the mutuals that they are practically exempt from such disasters involves the assumption that all their employes are supermen, never careless and always doing the right thing at the right time. As a matter of course the form of insurance protection carried has nothing to do with the character of the workmen, who are quite as likely to be careless in a mutual as in a stock company risk.

Industrial Accidents in Canada

DURING the month of February, according to the industrial accident record of the Department of Labor, of the Dominion of Canada, 48 workers were killed and 344 were injured in the course of their employment. In January, 1917, 63 persons were killed and 371 injured, while the record for February, 1916, was 56 killed and 290 injured. Comparing the January and February records it will be seen that February showed a decrease of 15 in the number of fatalities and of 27 in the number of injured, while in February of last year there were 8 more lives lost and 54 fewer injuries than during the corresponding month of this year.

Fire Dangers in Phoenix

THE engineers of the National Board of Fire Underwriters say with regard to the fire danger in the mercantile district of Phoenix, Ariz.: "Owing to the numerous large areas of mainly weak construction, serious individual fires are liable to occur in the principal mercantile district, but buildings are mainly low, streets of good width, high winds infrequent and fire-fighting facilities mainly adequate, and the probability of a fire extending

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over a considerable portion of the district is only moderate. Among the warehouses, manufacturing plants and minor mercantile sections serious local fires are only probable. The residential sections are intermingled brick and frame, with a considerable proportion of incombustible roofs, and have a normally mild hazard."

Big Fires Possible in Toledo

IN reporting on the fire hazard in Toledo, Ohio, the engineers of the National Board of Fire Underwriters say: Severe individual and group fires are probable throughout the congested value district, due principally to the many large to excessive areas and communicating groups, weak construction, frequent high winds and present undermanned condition of the fire department. The use of the high pressure fire system, in connection with several other valuable mitigating features, should prevent the occurrence of a sweeping fire, except under very adverse conditions, such as a further reduction in the manual force of the fire department. Serious fires endangering the main district are probable in a wholesale and manufacturing district. Individual to severe group fires are probable in minor mercantile and other manufacturing districts. In dwelling sections the flying brand hazard, due to shingle roofs, is increased by mainly inadequate fire fighting facilities; congestion is present and sweeping fires are probable."

"Cut Down the Booze"

ONE short extract from "The Ingot" by the Raritan Copper Works, Perth Amboy, N. J., has been copied in several safety organs in other plants. In commenting on the finding of its safety department that the greatest peril is in the first hour of the day shift following Sundays or holidays, it remarks: "To any man who can think in a straight line these statistics mean just one thing. It is a plain fact, and we'll state it plainly. Too much drinking at night means foggy eyes and unsteady nerves next morning. Then the accidents pile up. Now let's get right down to brass tacks. This is no grape-juice journal. We hold no brief for prohibition. What we are working for is safety. Cut down the booze, and as surely as day follows night you will cut down the accidents."

Rochester's Safety Activities

MOVING picture theaters in Rochester are co-operating with the Rochester Local Safety Council in the accident elimination campaign by showing slides picturing careless practices. The *Rochester Post Express* is also helping along the publicity work with cuts made from the same pictures shown in the theaters. "Wait until the car on which you have been riding has gone ahead, before crossing the opposite bound tracks. Look and listen for the car that may strike you. Time required, one minute. Would you bet your life against 60 seconds?" is an example of the snappy advice accompanying the pictures.

Turn Down the Nails

"TURN Down More Nails" is the way in which the Corn Products Refining Company heads a bulletin reinforcing a previous warning. This sort of accident is not confined to the refining industry. It does not receive as much attention as some forms of injury, for it is not usually fatal, but many men are laid up and kept from working by out-of-place nails—and there is always the danger of tetanus.

How One Man Spent His Bonus

ON the day following the bonus distribution, one man alone failed to show up for work, says the General Chemical Company's bulletin. When he did come back, a day or so later, he limped and his more or less battered appearance showed that he had been doing something requiring great muscular labor, in which he had received his share of knocks. He plausibly

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explained his absence and his condition by the use he made of the bonus. He is a family man, so he bought a large pig, complete, for present and future consumption. The arduous task of getting this 200 pounds of ham and sausage on the hoof to his home incapacitated him for labor the next day. The editor of the bulletin observes: "He should have thought of 'Safety First' and had the pig delivered in sections from the nearby butcher."

Kansas Safety Museum

THE Kansas Department of Labor and Industry has opened a State Safety Museum in the Capitol Building at Topeka. Manufacturers were invited to contribute to the exhibit and the response was so generous that it crowded the room. State Labor Commissioner P. J. McBride hopes to arrange for a railway car to be used as a traveling museum to visit the cities and villages of the State and spread the safety gospel.

Good Order and Cleanliness

GOOD order and cleanliness are primary factors in the prevention of non-mechanical accidents in shops. The Brown & Sharpe Manufacturing Company, of Providence, R. I., advises the careful storing of tools and supplies, with white lines painted on the floor to keep all material out of the aisles so formed. If work must extend into free spaces, a guard sign is placed to call attention to the unusual situation. A system of storing ladders by means of overhead racks which prevent accidental falls is commended.

Syracuse Safety Conference

A COMMITTEE appointed by the New York State Industrial Commission, and of which R. J. Cullen, deputy industrial commissioner, was chairman, held a conference in Syracuse recently to consider rules for safeguarding the lives of industrial workers, especially in plants where dangerous machinery is used. Some of the large plants have installed various safety devices and follow certain rules which their experts have found worth while, and to make such rules and safety devices mandatory in all plants was one of the purposes of the conference. Both employers and employes are represented in the personnel of the committee. A hearing on the proposed State boiler code was held at Syracuse in April.

N. Y. Central "Stop" Discs

THE New York Central lines have substituted an oval metal disc bearing the word "STOP" for the familiar flag formerly used by watchmen in warning drivers of the approach of a train. An investigation by the safety bureau of the road showed that out of 8,000 vehicles which crossed the tracks at three separate crossings during a 12-hour period less than 400 of the drivers looked both ways before crossing. Statistics show that during the past five years accidents to persons crossing railroads at grade crossings have doubled. Most of the injured persons are automobilists.

Tenement House Fires

NEW YORK CITY had 756 fewer tenement house fires in 1916 than in 1915, attributable, according to Fire Commissioner Adamson, to the co-operative effort of the Fire Prevention Bureau and the Tenement House Department. He thinks that the number could be reduced further with a little more care on the part of tenants.

Traffic Control In Akron

THE Boy Scouts of Akron, Ohio, have been enlisted by the Akron Automobile Club to assist in the "traffic safety" campaign the club is conducting. The boys are under the direction of Safety Director Charles R. Morgan and the movement is reported to be very successful.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection amounts to little in numerous cases.

CEMENT, TILE AND OTHER KILN INDUSTRIES

February 7, 1917. East Liverpool, Ohio. Potteries Milling & Mining Company. Pennsylvania R. R. Making of flint glass. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, hot bearings. Fire started at west end of building. Discovered by night watchman about 12:15 a. m. Alarm, telephone. Duration, about 4 hours; under control in 30 minutes. Stopped at boiler room. Fire was retarded by brick partitions. Persons in building, 25. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $100,000. Property loss, $45,000.

CHURCHES

February 5, 1917. Winnipeg, Man. Grace Methodist Church. Notre Dame avenue. One building, approximately 3 stories, damaged. Walls, brick. Floors, wood. Roofs, shingles. Cause, overheated stove. Fire started under organ. Discovered by janitor when attending to stoves about 12:35 p. m. Alarm, telephone. Duration, 45 minutes. Stopped at place of origin. Persons in building, 3. Means of escape, doors on 3 sides. Value of building and contents, $55,000. Property loss, $10,175.

February 12, 1917. Oxford, Ohio. St. Mary's Church. Race and Locust avenue. One-story church destroyed and 2-story dwelling damaged. Walls, brick. Floors, wood. Roofs, wood on buildings; slate on steeple of church. Cause, spark from chimney. Fire started on roof. Discovered by smoke issuing from roof about 10:35 a. m. Alarm, telephone. Duration, 4 hours. Stopped when church was consumed and roof of dwelling was burned. Fire was favored by its origin in roof and ceiling. Firemen handicapped by high wind. Persons in building, about 200. Means of escape, 1 main entrance.

CLUBHOUSES, CITY AND COUNTRY

January 4, 1917. Waco, Tex. Huaco Club. Sanger and 29th streets. Clubhouse. Two buildings destroyed. Clubhouse, 2 stories; bowling alley, 1 story. Walls, frame. Floors, wood. Roofs, shingles. Cause, unknown. Discovered by man sleeping in building about 1:05 a. m. Alarm, telephone. Stopped when building was consumed; located one block outside of city limits. Fire was favored by inflammable construction. Firemen handicapped by rapid headway of fire and tardy alarm. Private fire apparatus, chemical extinguisher and standpipe. Persons in building, 1. Means of escape, stairway. Value of buildings and contents, $45,000. Property loss, total.

March 1, 1917. Elkhart, Ind. Christiana Country Club. Bristol street, outside city limits. Clubhouse. One 2-story building destroyed. Walls, frame. Floors, wood. Roofs, shingles. Cause, defective chimney. Fire started in roof. Discovered by employes of automobile plant nearby about 12:05 p. m. Alarm, box. Duration, about 7 hours. Stopped when building was burned to 1st floor. Fire was favored by old and dry wood construction. Firemen handicapped as only one line of hose, 1,700 feet, could be laid. Three sections burst at critical time. Persons in building, 2. Means of escape, inside stairway. Value of building and contents, $20,000. Property loss, $15,000.

COTTONSEED OIL MILLS

February 12, 1917. Granger, Tex. Granger cottonseed oil mill. One 1-story building (seedhouse) destroyed. Walls, corrugated iron. Floors, concrete. Roofs, corrugated iron. Cause, unknown. Fire started in north end of building. Discovered by night watchman about 4:30 a. m. Alarm, mill whistle and alarm bells. Duration, 12 hours. Stopped at south end of building. Fire was retarded by substantial construction. Persons in building, one. Means of escape, door in south end and openings on sides. Value of building and contents, $180,000. Property loss, $35,000.

DEPARTMENT STORES

February 7, 1917. Monroe, N. C. Belkst Brothers Company. Main street. Shoes, dry goods and millinery. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, probably defective electric wires. Discovered by seeing flames through the windows about 7 o'clock. Alarm, telephone. Duration, 7 hours. Stopped in same building. Fire was retarded by solid interior walls and metal ceiling. Private fire apparatus, a few chemical extinguishers. Persons in building, none. Means of escape,

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doors and windows. Value of building and contents, $93,000. Property loss, $15,000 on building.

February 9, 1917. Herkimer, N. Y. Munger department store and others. Main and Green streets. Department store, shoe, drug and grocery store, printing office and saloon. Three 3- and 4-story buildings destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in 2nd story of department store. Discovered by flames coming through the windows about 7:33 a. m. Alarm, verbal and street box. Duration, 15 hours. Stopped at Graves building on Main street, at the municipal building on Green street. Private fire apparatus, hand extinguishers. Persons in building, 10. Killed, 1. Means of escape, 2 iron fire escapes. Value of buildings and contents from $50,000 to $60,000.

February 17, 1917. Minneapolis, Minn. Annex of Dayton department store. 722-734 Nicollet avenue. Department store; shoes and pianos in annex. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in basement. Discovered by night watchman about 1:10 a. m. Alarm, street box. Duration, several hours. Stopped when building was consumed. Fire was favored—ordinary joisted construction, covering 12,000 sq. ft., with unprotected floor openings. Firemen handicapped by inability to get at the fire in basement. Private fire apparatus, chemical extinguishers. Persons in building, none. Means of escape, only 2 stories. Value of building and contents not reported to SAFETY ENGINEERING.

February 19, 1917. Quebec, Que. Simard & Carmichael and others. St. Joseph street. Dry goods. Three 3-story buildings destroyed. Walls, wood and brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in third flat. Discovered by passerby about 12:35 a. m. Alarm, Gamewell system. Duration, 9 hours. Fire was favored by wood construction. Firemen handicapped by narrow street in rear. Persons in buildings, 25. Killed, 3 firemen; 5 firemen injured. Means of escape, none. Value of buildings and contents, $397,000. Property loss, $63,500.

DWELLINGS, ORDINARY, CITY

February 11, 1917. Minneapolis, Minn. Charles C. Collins. 2841 Lake of Iles Boulevard. Dwelling. One 2-story building damaged. Walls, wood. Floors, wood. Roofs, shingles. Cause, sparks from chimney on roof. Fire started in roof. Discovered by occupants about 12:10 p. m. Alarm, telephone. Duration, 2 hours, 20 minutes. Stopped at attic. Fire was favored by light wood construction. Persons in building, 4. Means of escape, usual exits. Value of building and contents, $8,500. Property loss, $2,500.

DWELLINGS, ORDINARY, COUNTRY

February 19, 1917. Taber, Alta. F. Dase. Government road, three miles from the town. Dwelling. One 2-story dwelling destroyed. Walls, wood. Floors, wood. Roofs, shingles. Cause, unknown. Fire was discovered by neighbors the next day. Stopped when building was entirely consumed. Fire was favored by all wood construction. Persons in building, 6. All burned to death. Means of escape, none. Value of building and contents, $980. At the time this house burned a high wind was blowing. The nearest neighbors were more than a mile distant. A neighbor passing the next day found only the cement foundation of the house remaining. All the bodies of the occupants were burned beyond recognition.

DWELLINGS, PALATIAL

February 26, 1917. Oberlin, Ohio. T. Henderson. One and one-half miles east of Oberlin. Dwelling. One 2-story building destroyed. Walls, front of building, tile and cement; rear, wood. Floors, wood. Roofs, stained shingles. Cause, crossed electric wires. Fire started in partition between front and rear. Discovered by the smell of smoke about 3:10 a. m. Alarm, telephone. Duration, 3 hours. Stopped when house was completely destroyed. Fire was favored by open partition from basement to attic. Fire department did not respond. Outside of corporation and beyond reach of hose lines. Sent small chemicals. Private fire apparatus, two Pyrene extinguishers and private water system. Persons in building, none. Means of escape, usual exits. Value of building and contents, $75,000. Property loss, $60,000.

FOUNDRIES AND MACHINE SHOPS

February 1, 1917. Davenport, Iowa. Davenport Locomotive Works. 2305 Rockingham road. Manufacturing locomotives. One 2- and 3-story building destroyed. Walls, brick. Floors, earth. Roofs, wood, tar and gravel covering. Cause, explosion of crude oil. Fire started near blower. Discovered by employes about 1:52 p. m. Alarm, telephone and box. Duration, 6 hours. Stopped in same building. Fire was retarded by brick walls. Persons in building, 25. Injured, 1. Means of escape, doors and windows. Value of building and contents, $40,000. Property loss, $32,000.

February 4, 1917. Berwick, Pa. American Car & Foundry Company. West of Oak street. Manufacturers iron and steel. One 1-story building destroyed. Walls, brick. Floors, wood and cement. Roofs, gravel composition. Cause, unknown; possibly spontaneous combustion. Fire started inside building. Discovered by watchman about 5:07 a. m. Alarm, box. Duration, about 3 hours. Stopped when building was consumed. Fire was retarded by construction of roof and building; confined to building by fire-wall. Private fire apparatus, pump and hose manned by employes. Persons in building, none. Means of escape, doors and windows. Value of building and contents, $125,000. Property loss, $125,000.

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GARAGES AND AUTO REPAIR SHOPS

February 19, 1917. Corning, N. Y. McGivern garage. Rear of 13 West 1st street. Formerly a barn, converted into a garage. Roof and upper story of 2-story building destroyed. Walls, wood. Floors, concrete. Roofs, wood shingles. Cause, unknown. Fire started in 1st story near entrance. Discovered by passersby about 7:40 p. m. Alarm, telephone. Duration, 1 hour, 15 minutes. Confined to building. Fire was favored by wood construction. Firemen handicapped by location of building in alley, wooden buildings and barns in close proximity. Persons in building, none. Injured, 1 fireman; 2 ribs broken. Means of escape, ample. Property loss, $800 on building; about $6,000 damage to 14 automobiles.

GRAIN ELEVATORS

February 13, 1917. Maple Grove, Ohio. Farmers' elevator. Bettsville and Maple Grove road. Grain elevator. One building destroyed; 54 feet at highest point. Walls, wood. Floors, wood. Roofs, metal. Cause, backfiring of gasoline engine. Fire started in engine room. Discovered by a workman about 12 noon. No fire department. Duration, 3 hours. Stopped in building where it started. Fire was favored by wood construction. Private fire apparatus, hand extinguishers. Persons in building, 2 employes. Means of escape, ordinary doors. Value of building and contents, $12,500. Property loss, total.

February 22, 1917. Scranton, Iowa. Scranton Farmers' elevator. Main street. Grain, lumber, coal, cement, etc. One 3-story building destroyed. Walls, wood. Floors, wood. Roofs, shingle. Cause, unknown. Fire started inside of building. Discovered by night employe at railway station about 3:30 a. m. Alarm, fire bell. Duration, several hours. Stopped when elevator was consumed. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $4,000 building, $10,000 worth of grain.

February 25, 1917. Louisville, Ky. Kentucky Public Elevator Co.; also 75 freight cars of the Illinois Central R. R. Church & Gallagher, 13th and 15th streets. Grain dealers. One building destroyed. Walls, wood. Floors, wood. Roofs, metal. Cause, unknown. Fire started supposedly about the 4th floor. Discovered by citizen who saw flames about 4.52 p. m., first alarm; third alarm at 4.54 p. m. Alarm, telephone, automatic, and street box. Duration, under control in 3 hours. Intense heat started fires in other buildings and cars. Fire was favored by open construction in interior. Firemen handicapped by difficulty in reaching cars in railroad yards; no water in the yards. Persons in building, none. Means of escape, none. Value of building and contents, $750,000.

HOSPITALS AND SANITARIUMS

January 21, 1917. Spokane, Wash. St. Luke's Hospital. N. W. Mallon and A streets. One 3½-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood shingles. Cause, sparks on shingle roof. Fire started in roof. Discovered by occupants about 5:40 p. m. Alarm, Gamewell system. Duration, 3 hours. Fire was confined to upper story and roof. Persons in building, not reported to SAFETY ENGINEERING. Means of escape, inside stairways and outside fire escapes. Value of building and contents, $107,800. Property loss, $44,260.

HOTELS AND LODGING HOUSES

Feb. 10, 1917. Boston, Mass. Hotel Lenox. 50 Exeter street. One 11-story building damaged. Walls, stone and brick. Floors, hollow tiling. Roofs, concrete. Cause, careless use of cigarettes. Fire started in 3rd story—rear room. Discovered by occupant of room who gave the alarm about 5 a. m. Alarm, Gamewell system. Duration, 1 hour, 30 minutes. Stopped at 11th story. Fire was retarded by corridor walls of fireproof construction. Firemen handicapped by height of building; ladders reached only to 8th floor. Private fire apparatus, 2-inch standpipes and 3-gallon extinguishers on each floor. Persons in building about 200. Injured, 5. One person died 10 days later. Means of escape, open stairway in front, enclosed stairway in rear. Value of building and contents, about $450,000. Property loss, $50,000. Fire started in a guest's room at westerly end of building. A 50-mile gale was blowing from the west. The occupant on discovering the fire left room door open, also windows on west side. The fire was blown out along the corridor to front elevator and stair shaft, was drawn upward by strong draft to upper floor. The fire swept through the corridor of 6th floor and into rooms, the doors of which had been left open by fleeing occupants. More damage was done on the 6th floor than on any other. The front stairway was open from the 1st to the 11th floor. The elevator which adjoined the front stairway was enclosed by fireproof material on 3 sides, but entrance side was open grillwork, which caused fire to travel upward to the upper floors.

Feb. 11, 1917. Arborg, Man. Arborg Hotel and others. Railway avenue and 1st street. Hotel, general store, drug store and pool room. Four 2-story buildings destroyed. Walls, frame. Floors, wood. Cause, defective stovepipe in general store. Fire started around stovepipe. Discovered by owner of store about 8 a. m. No fire department. Duration, 2 hours. Stopped when 4 buildings were consumed. Fire was favored by wood construction. Private fire apparatus, a small chemical engine. Persons in building, about 40. Means of escape, doors. Value of buildings and contents, $25,000. Property loss, $10,000.

February 12, 1917. Minneapolis, Minn. Kenwood Hotel. Hennepin avenue and 12th street. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in basement. Discov-

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ered by janitor about 11:40 p. m. Alarm, telephone. Duration, 3 hours, 45 minutes. Stopped when building was destroyed. Fire was favored by flimsy construction. Firemen handicapped by the fact that all first-alarm companies were at another fire. Private fire apparatus, chemical extinguishers. Persons in building, 50. Killed, 4 in building and 2 died in hospital later. Means of escape, 3 inside stairways and 1 outside fire escape. Value of building and contents, $21,000. Property loss, total.

INSTITUTIONAL BUILDINGS

February 24, 1917. Peoria, Ill. State Hospital. South Bartonville. Insane asylum—laundry building. One 1-story building destroyed. Walls, brick. Floors, wood and cement. Roofs, tile. Cause, incendiary. Fire discovered by watchman about 4:30 a. m. Alarm, telephone. Duration, about 5 hours. Fire confined to one building. Fire was favored by open construction; no partitions inside. Private fire apparatus; hose line belonging to hospital was found to have been cut when needed for use. Persons in building, none. Means of escape, 1-story building only.

IRON AND STEEL MILLS

February 3, 1917. Roanoke, Va. Virginia Bridge & Iron Company. West of 9th street, N. E. Manufacturer of bridge and structural steel. A part of one 2-story building destroyed. Walls, corrugated steel siding on steel columns. Floors, wood on wood and iron stringers. Roofs, corrugated steel. Cause, supposedly from electric wire. Fire started in tool room. Discovered by night employe about 1:44 a. m. Alarm, regular system. Duration 2¼ hours. Stopped in building where it originated. Fire was retarded by substantial construction. Firemen handicapped by extreme cold and frozen hydrants; also by insufficient number of hydrants. Private fire apparatus, 2 standpipes, but water was cut off and no one present knew the location of the valve. Persons in building, 20. Means of escape, not reported to SAFETY ENGINEERING.

LAUNDRIES

February 12, 1917. Davenport, Iowa. Building of Davenport Woolen Mills. 1231-1235 E street. Wet Wash Laundry. Part of one 2-story building destroyed. Walls, brick. Floors, wood. Roofs, wood covered with tar and gravel. Cause, boiler explosion in basement of laundry. Fire started in basement. Discovered by neighbor after the explosion about 2:08 a. m. Alarm, box. Duration, 6 hours. Stopped in same building. Fire was favored by inflammable construction. Persons in building, 3. Means of escape, doors and windows. Value of building and contents, $15,000. Property loss, $6,500.

MANUFACTORIES, MISCELLANEOUS

January 31, 1917. Minneapolis, Minn. Levin Brothers. 31-43 S. E. Main street. Manufacturing furniture. One 5-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in basement. Discovered by employes about 7:08 a. m. Alarm, still. Duration, department worked all day. Fire stopped when building was consumed. Fire was favored by interior wood construction. Firemen handicapped by extreme cold; also fire-doors had been left open. Private fire apparatus, chemical extinguisher and standpipe. Persons in building, 2. Means of escape, 2 enclosed inside stairways and 1 outside fire escape. Value of building and contents, $160,000. Property loss, total.

February 16, 1917. Sheboygan, Wis. Joerns Brothers Manufacturing Co. Maryland avenue and 20th street. Furniture factory. Three 3-story buildings destroyed. Walls, frame and concrete. Floors, wood and concrete. Roofs, wood. Cause, spontaneous combustion. Fire started in 3rd floor of paint shop, frame building. Discovered by watchman in nearby factory who heard explosion and saw flames about 8:05 p. m. Alarm, telephone. Duration, 15 hours. Stopped in concrete building which was gutted. Fire was favored by wood construction of 2 buildings and the inflammable contents of the concrete building. Firemen handicapped by lack of water. Persons in building, 1. Injured, 2 firemen. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $95,000. Property loss, $85,000.

February 23, 1917. Carnegie, Pa. American Sparkler Co. Third avenue and 4th street. Manufacturing "sparklers"—fireworks. Two 2-story buildings destroyed; one 2-story building partially destroyed. Walls, wood. Floors, wood. Roofs, slate. Cause, company says spark from crossed electric wires; fire chief says explosion in mixer. Discovered by employe at work on the mixer in basement about 8 a. m. Alarm, telephone. Duration, about 2 hours. Stopped at 317 3rd avenue after 2 buildings were consumed. Fire was favored by cheap construction. "Worst firetrap in the State of Pennsylvania." Persons in building, 18. Injured, 1; man in charge of mixer. Means of escape, 2 stairways, front and rear. Value of buildings and contents, $21,000. Property loss, $21,000.

February 23, 1917. Toledo, Ohio. Willys-Overland Company. Central avenue and L. S. & M. S. Ry. Manufacturing automobiles. One 4-story building damaged; windows and skylight blown out. Walls, brick. Floors, concrete. Roofs, frame. Cause, explosion of enameling oven. Fire started in 4th story. Discovered by employes about 1:05 p. m. Alarm from street box on the premises. Duration, extinguished by sprinkler system. Stopped in 4th story. Fire was retarded by substantial construction. Private fire apparatus, company's own department and sprinkler system. Persons in building, 60 on floor where fire occurred. Killed, 2. Injured, 4. Means of escape, stairways. Value of building and contents, $300,000. Property loss, $25,000.

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MERCANTILES, MISCELLANEOUS

February 6, 1917. Geneva, N. Y. Fairfax block. 64 Seneca street. Confectionery. One 3-story building destroyed. Walls, brick exterior, wood partitions. Floors, wood. Roofs, tin. Cause, probably cigarette. Fire started in cellar. Discovered by police about 1:30 a. m. Alarm, Gamewell system. Duration, 5 hours. Stopped in same building. Fire was favored by wood interior; partially destroyed twice previously. Firemen handicapped by wind and extreme cold. Persons in building, none. Means of escape, stairway. Value of building and contents, $45,000. Property loss, $25,000.

February 12, 1917. Hamilton, Ont. Grafton & Co. 16-18 James street, N. "Ready-to-wear" clothing. One 3-story building destroyed, one 3- and one 4-story building, damaged. Walls, brick. Floors, wood. Roofs, felt and gravel. Cause, unknown. Fire started in rear of the Grafton building. Discovered by a printer across the street about 8:52 p. m. Alarm, telephone. Duration, under control in 4 hours. Fire was favored by wood interior, wire guards on windows and defective fire walls. Firemen handicapped by wire window guards. Private fire apparatus, water pails nested in casks throughout the building. Persons in building, none. Means of escape, 1 front and 1 rear entrance. Value of buildings and contents, $431,500. Property loss, $15,000.

February 14, 1917. Lawrenceville, Pa. Crowl & Carpenter (department store). Department store and hardware store. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, asphalt, Cause, undetermined. Fire started in basement near tank of kerosene oil. Discovered by watchman and passersby about 8:40 p. m. Alarm, fire bell. Duration, about 4 hours. Confined to one building. Fire was retarded by brick walls. Firemen handicapped by frozen water pipe. Caused few minutes' delay only. Private fire apparatus, small hand extinguishers. Persons in building, none. Means of escape, ample stairways, doors and windows. Value of building and contents, approximately $50,000. Property loss, practically total.

MERCANTILES, TENANT BUILDINGS

February 12, 1917. St. John, N. B. Kennedy building. Prince William street. Wholesale grocery and offices. Part of one 6-story building destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, undetermined; possibly cigarette. Fire started in toilet room. Discovered by passerby about 9:05 p. m. Alarm, box. Duration, 1½ hours. Stopped at roof where shaft from toilet had its outlet. Persons in building, none. Means of escape, ample stairways. Value of building and contents, $100,000. Property loss, $2,000 on building; $5,500 on stocks.

February 20, 1917. Somerville, N. J. Association Hall building. Main street. Dry goods, crockery, printing plant. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in second story. Discovered by mail carrier about 6:45 a. m. Alarm, Gamewell system. Duration, 5 hours. Stopped in building where it started. Fire was retarded by heavy brick wall. Firemen handicapped by insufficient water pressure. Private fire apparatus, one fire company from Bound Brook and one from Raritan. Persons in building, 5. Means of escape, no fire escapes; occupants taken out by means of ladders. Value of building and contents, $135,000. Property loss, $16,000.

METAL WORKERS

February 23, 1917. Topeka, Kan. Steel Fixture Manufacturing Company. 621-29 Holliday street. Steel office fixtures. One 1-story building partially destroyed. Walls, frame, covered with metal side-walls. Floors, wood. Roofs, frame, composition roofing. Cause, supposedly natural gas escaping. Fire started in oven room. Discovered by employe about 1:20 a. m. Alarm, telephone. Duration, under control in 30 minutes. Stopped in same building. Fire was favored by light construction. Firemen handicapped by railroad tracks and small water mains. Persons in building, 2. Means of escape, 1-story building only. Value of building and contents, $147,000. Property loss, $10,000 to $15,000. The company has announced that, in rebuilding its plant, the oven and finishing room where the products are dipped and baked will be separated from the main plant by a 13-inch brick wall with standard, double, self-closing fire doors in all openings.

OIL WORKS AND TANKS

February 23, 1917. Warren, Ohio. Freedom Oil Company. Woodland avenue. Wholesale and retail gasoline and oil. One 1½-story building destroyed. Walls, brick. Floors, concrete. Roofs, slate and iron. Cause, explosion of gasoline. Fire started in office. Discovered by employe lighting match about 6:30 a. m. Alarm, telephone and box. Duration, 6 hours. Fire was favored by contents of building. Persons in building, 4. Killed, 1. Injured, 3. Means of escape, doors and windows on ground floor. Value of building and contents, approximately $20,000.

PAPER AND PULP MILLS

February 18, 1917. Watertown, N. Y. International Paper Company. 9-15 Sewell street. Manufacturing paper. Part of one 2- and 3-story building destroyed. Walls, brick and wood. Floors, wood and steel. Roofs, wood and slag. Cause, cinder pile outside of mill. Fire started in east end of 2-story brick storeroom. Discovered by watchman about 2 a. m. Alarm, from street box at 2:20 a. m. Duration, about 9 hours. Stopped at wall of beater room. Fire was favored by wood partitions. Firemen handicapped by frozen hydrants, mill's sprinkler system did not work, and the mill's water pump was not working. Private fire apparatus, hose and reels, plug outlets from mill pump, also sprinklers. Persons in building, 2. Means of escape, fire escapes. Value of building and contents, approximately $225,000. Property loss, $35,000.

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Underwriters' Standards for Communi-

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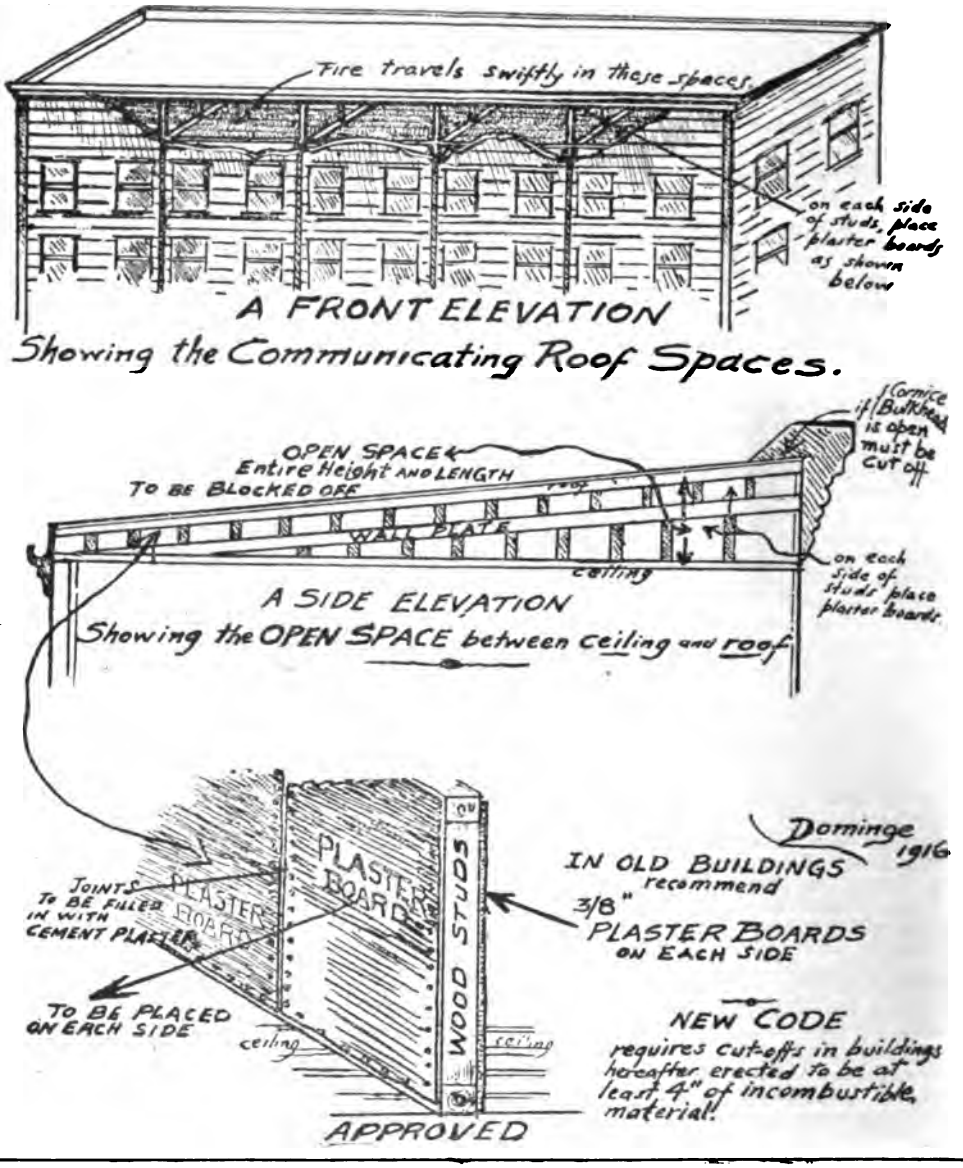
Fire travels swiftly in these spaces
on each side of studs, place plaster boards as shown below
A FRONT ELEVATION
Showing the Communicating Roof Spaces.
Cornice if Bulkhead is open must be cut off
OPEN SPACE Entire Height AND LENGTH TO BE BLOCKED OFF
WALL PLATE
ceiling
on each side of studs place plaster boards
A SIDE ELEVATION
Showing the OPEN SPACE between ceiling and roof
JOINTS TO BE FILLED IN WITH CEMENT PLASTER
PLASTER BOARD
WOOD STUDS
TO BE PLACED ON EACH SIDE
ceiling
ceiling
APPROVED
Dorninge 1916
IN OLD BUILDINGS recommend
3/8" PLASTER BOARDS ON EACH SIDE
NEW CODE
requires cut-offs in buildings hereafter erected to be at least 4" of incombustible material.

SCHOOLS AND COLLEGES

February 3, 1917. Chicago, Ill. Helen E. Starrett School for Girls. 4708-10 Woodlawn avenue. Private school. One 3-story building partially destroyed. Walls, frame. Floors, wood. Roofs, wood shingles. Cause, unknown. Fire started in basement. Discovered by occupants of building. Alarm, still, followed by street box. Duration, about 1 hour. Stopped under roof of same building. Fire was favored by "dummy" elevator shaft running from the basement to the top floor. Persons in building, 20 to 25. Means of escape, front and rear stairways. Value of building and contents, approximately $16,000. Property loss, $2,500.

February 17, 1917. Eureka, Kan. East Side school. Third and Mulberry streets. Five buildings destroyed; from ordinary barns to 2-story school building. Walls, stone. Floors, wood. Roofs, metal. Cause, brands from adjacent fire. Fire started at top of cupola about 2:30 p. m. Fire burned from cupola down, fanned by high wind. Stopped when

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cating Roof Spaces in Frame Buildings

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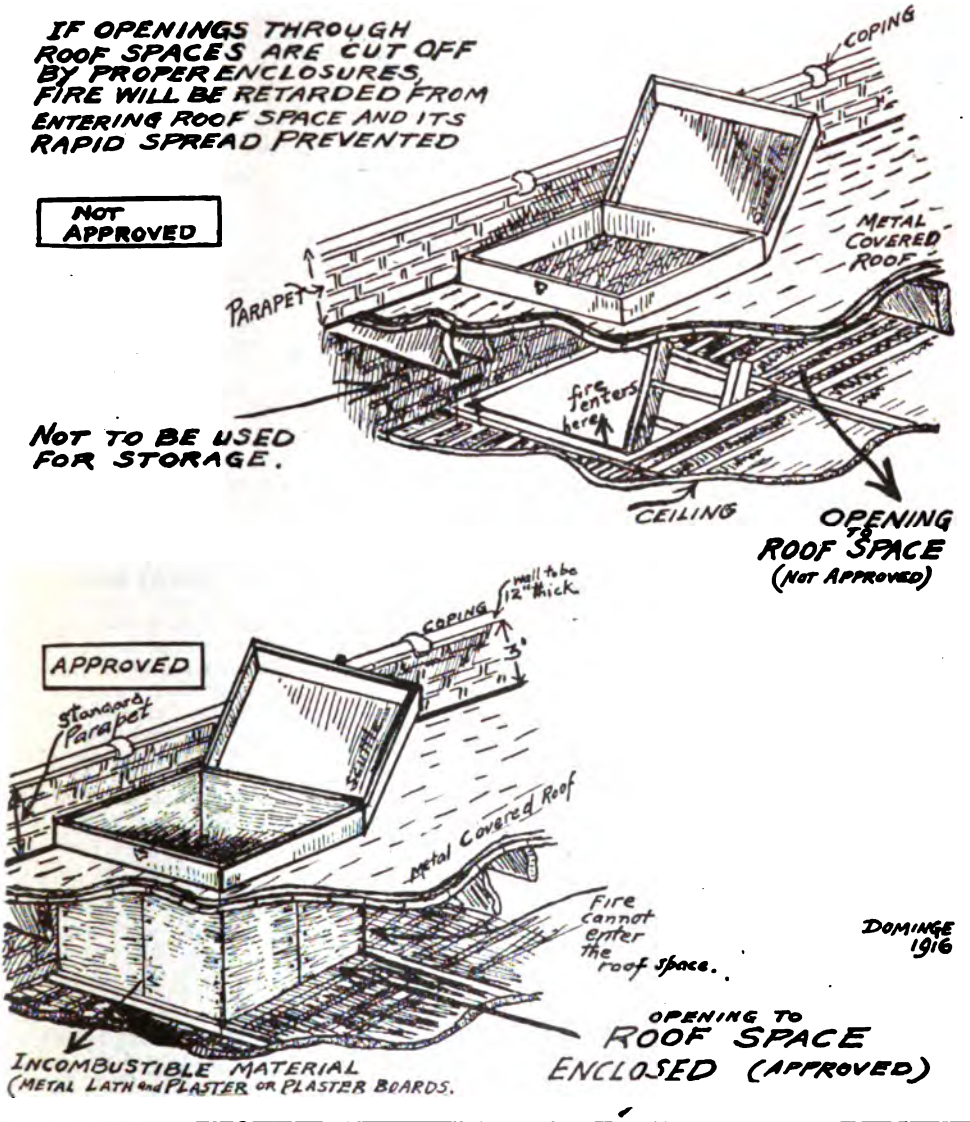
IF OPENINGS THROUGH ROOF SPACES ARE CUT OFF BY PROPER ENCLOSURES, FIRE WILL BE RETARDED FROM ENTERING ROOF SPACE AND ITS RAPID SPREAD PREVENTED
NOT APPROVED
COPING
METAL COVERED ROOF
PARAPET
fire enters here
NOT TO BE USED FOR STORAGE.
CEILING
OPENING TO ROOF SPACE (NOT APPROVED)
APPROVED
wall to be 12" thick
COPING
3'
Standard Parapet
SKYLIGHT
Metal Covered Roof
Fire cannot enter the roof space.
DOMINGE 1916
OPENING TO ROOF SPACE ENCLOSED (APPROVED)
INCOMBUSTIBLE MATERIAL (METAL LATH and PLASTER OR PLASTER BOARDS.

buildings were consumed. Fire was favored by construction above second story ceiling which was of open woodwork over entire building. Firemen handicapped by insufficient water pressure. Private fire apparatus, 4 Pyrene extinguishers. Persons in building, 200 pupils removed before school building ignited. Means of escape, fire escapes and stairways. Value of buildings and contents, $18,000. Property loss, total.

February 24, 1917. Syracuse, N. Y. Porter school. St. Mark avenue and Emerson street. Public school. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Discovered by policeman; entire building in flames when alarm was sent in about 2:24 a. m. Alarm, street box. Duration, 8 hours. Stopped when building was consumed. Fire was favored by all wood interior, no fire partitions. Firemen handicapped by advancement of fire when alarm was received. Persons in building, none. Means of escape, fire escapes. Value of building and contents, $50,000. Property loss, total.

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STABLES

February 20, 1917. Lamar, Colo. Feed barn. N. Main street. One 1-story building destroyed. Walls, wood. Floors, cement. Roofs, wood. Cause, probably cigarette. Fire started near center of building. Discovered by person at the barn about 8:20 p. m. Alarm, telephone. Duration, 3 hours. Fire was confined to building. Fire was favored by wood construction. Firemen handicapped by inability to get water. Persons in building, none. Means of escape, ordinary doorways. Value of building and contents, $12,000 to $15,000. Property loss, total.

THEATERS AND AMUSEMENT PLACES

January 20, 1917. Seattle, Wash. Grand Opera House. 217 Cherry street. Vaudeville theater. Building partially destroyed; equivalent of 3 or 4 stories. Walls, brick. Floors, wood. Roofs, wood covered with composition. Cause, supposedly cigarette or match under balcony floor. Fire started under floor of balcony. Discovered by boy sweeping out who saw smoke about 6:10 a. m. Alarm, fire alarm telegraph. Duration, about 2 hours. Stopped after burning interior of balcony and part of roof. Fire was favored by light frame work. No fire stops. Private fire apparatus, hose lines; not used. Persons in building, 1. Killed, 1. Injured, 8 firemen. Means of escape, good fire escapes and stairs. Value of building and contents, $40,000. Property loss, $12,000. Battalion fire-chief was instantly killed by falling roof.

February 21, 1917. Boston, Mass. Columbia theater and a business building. Washington street. Tailor shop on second floor; rest unoccupied as both buildings were being remodeled. One 6-story building and 1-story theater destroyed. Walls, brick. Floors, wood. Roofs, wood covered with tar, gravel and slate. Cause, unknown. Fire started in second story. Discovered by passerby about 6:57 p. m. Alarm, street box. Duration, 7½ hours. Stopped at adjacent buildings which were slightly damaged. Fire was favored by inflammable construction. Private fire apparatus, extinguishers, standpipe and hose. Persons in the building, none. Means of escape, 2 stairways and outside fire escape. Value of buildings and contents, $250,000. Property loss, $250,000. When the first alarm apparatus arrived, the building where fire started was ablaze from first to sixth floor and fire was extending into buildings across a blind alley in rear and a narrow street on side. Four alarms were sounded 9 minutes after the first one, and a fifth alarm 7 minutes later.

February 27, 1917. Clearfield, Pa. Clearfield opera house. Main business street. Theater and offices in second story, business establishments on ground floor, hall in third story. One 3-story building destroyed. Walls, solid brick. Floors, wood. Roofs, composition. Cause, supposedly defective flue. Fire started in scenery loft in third story, or in cupola. Discovered by night watchman in adjoining building about 1:20 a. m. Alarm, telephone and Gamewell system. Duration, 4 hours. Fire was confined to building in which it started. Fire was favored by frame cupola which acted as a chimney and allowed fire to break through roof almost immediately. Adjoining building was saved only by its automatic sprinkler system. Private fire apparatus, sprinkler system in adjoining building. Persons in building, none. Means of escape, metal fire escapes. Value of building and contents, $100,000. Property loss, $100,000.

VESSELS

February 13, 1917. Beaumont, Tex. Bowers Southern Dredging Co. On Neches River, Orange county side. Dredging. One dredge destroyed. Cause, watchman near gas tank lighted lantern. Fire started in engine room about 7 p. m. Alarm, telephone. Duration, 30 minutes. Stopped at water's edge. Firemen handicapped by river. Private fire apparatus, pump and buckets. Persons on dredge, engineer, wife and 3 children. Injured, engineer badly burned. Value of property, $100,000.

WAREHOUSES, PUBLIC STORES

January 28, 1917. Waco, Tex. McCrary Storage Co. Mary street, bet. 7th and 8th streets. Storage warehouse. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Discovered by watchman about 8:40 a. m. Alarm, Gamewell system. Duration, under control in 1½ hours. Stopped at place of origin. Private fire apparatus, 2 hose lines and connection with city water works. Persons in building, 1. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $125,000.

February 5, 1917. Kansas City, Mo. Cline Storage & Transfer Company, 1919-21 E. 15th street. Storage and transfer—household goods. Two 3-story buildings destroyed. Walls, brick. Floors, wood. Roofs, flat, tar covered. Cause, unknown. Discovered by citizen about 3:48 a. m. Alarm, telephone. Duration, about 4 hours. Stopped at adjoining building. Fire was favored; no wire glass in windows. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $16,500.

February 10, 1917. Fresno, Cal. J. B. Hill. 1654 H street. Grain and feed warehouse. One 1-story building destroyed. Walls, wood. Floors wood. Roofs, shingles. Cause, supposed to be heat in fertilizer. Fire started near middle of building. Discovered by passerby. Alarm, telephone. Stopped when building was consumed. Fire was favored by wood construction. Firemen handicapped by delay in locating the fire. Persons in building, none. Means of escape, 1-story building only. Value of building and contents, $15,000. Property loss, $11,000; about $4,000 worth of feed was salvaged.

February 24, 1917. Chicago, Ill. Mitchell & Enningor. 1801-1819 S. Canal street. Warehouse containing foodstuffs, etc. One 7-story

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building damaged. Walls, brick. Floors, cement on iron and wood beams. Roofs, corrugated iron. Cause, unknown. Fire started in 1st story, about 2:30 p. m. Alarm, telephone and box alarms. Duration, about 50 hours. Stopped in same building. Fire was retarded by small windows and cement floors. Building was partially empty. Firemen handicapped by frozen hydrants causing delay. Persons in building, none. Injured, 2 firemen. Means of escape, inside stairway and 3 fire escapes. Value of building and contents, $290,000. Property loss, $85,000.

KILLED AND INJURED IN FIRES

January 20. Seattle, Wash. Grand Opera House. Battalion fire chief instantly killed by falling roof. Eight firemen injured.

February 1. Davenport, Iowa. Davenport Locomotive Works. One person injured.

February 9. Herkimer, N. Y. Munger department store and other buildings. One person killed.

February 10. Boston, Mass. Hotel Lenox. Five persons injured; one died 10 days later.

February 12. Minneapolis, Minn. Kenwood Hotel. Four persons killed in building. Two died in the hospital later.

February 13. Beaumont, Tex. Dredge belonging to Bowers Southern Dredging Co. Engineer badly burned.

February 16. Sheboygan, Wis. Joerns Brothers Manufacturing Co. Furniture factory. Two firemen injured.

February 19. Corning, N. Y. McGivern garage. One fireman injured.

February 19. Taber, Alta. Dwelling of F. Dase on Government road, three miles from town. Six occupants; all burned beyond recognition.

February 19. Quebec, Que. Simard & Carmichael. Dry goods store. Three firemen killed; 5 firemen injured.

February 23. Toledo, Ohio. Willys-Overland Co. Automobile manufacturer. Two persons killed; 4 injured.

February 23. Warren, Ohio. Freedom Oil Co. One person killed; 3 injured.

February 23. Carnegie, Pa. American Sparkler Co. Manufacturer of fireworks. One man (in charge of mixer where fire originated) injured.

February 24. Chicago, Ill. Mitchell & Enningor. Warehouse. Two firemen injured.

Mine Accidents Not Unavoidable

By W. M. Jones

Mine Inspector for the New York State Industrial Commission.

IN a factory where the various machines, revolving shafts, and the like are guarded, reports of boiler inspections are posted in the power house, where provisions are made for proper ventilation and sanitation, and rules and provisions are made to guard against industrial diseases, the manufacturer may feel that he has protected his employes by providing the safeguards prescribed by law and rules and that he has anticipated all possibilities of accidents and may feel fairly assured of safety. Not so the mine operator. The mine operator is in constant fear of catastrophes, for his operations extend to new ground daily, his employes handle explosives, and are scattered in different directions underground where he himself cannot see them at a glance as in a factory. The roof under which a gang of miners work is sound today and tomorrow it is not, having been made unsafe by the force and the vibrations of blasts, the disintegration of walls and roofs, from ground movement or other natural causes. In addition to the factors anticipated the mine operator has to face more contingencies than the manufacturer, from "human failure." A mine foreman or shift-boss needs other traits in his make-up than those necessary in a shop foreman. The mine foreman must not only be gifted with the ability to get production, but he must be an evenly balanced person, free from moods; not one who today thinks of production and tomorrow thinks of safety, not a man who is always pleasant and talkative with his own nationality and cannot speak a respectful word to a foreigner.

In fact, the foreman and shift-boss fill responsible positions in mines, and the failure of judgment and failure to observe and to report on their part, nullifies all rules and regulations for safety. They should be able to make thorough inspections of conditions and should be constantly observing. They should neither take chances themselves nor let any employe take any, even if production is going to be affected.

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The operator instructs his mine superintendent and the mine superintendent, in turn, instructs the mine foreman for local safety in the mine. The mine superintendent is inseparably responsible for the entire operation and watches for contingencies that may result in a catastrophe. He sees that safe hoisting machinery and equipment are maintained as well as supervising his deputies in the mine.

One of the most salutary works of the superintendent is the thorough investigation of the cause of every accident, whether the accident has resulted in injuries or not. He should not take the report of even the mine foreman and shift-boss without the corroboration of eye witnesses, and he should endeavor to find out whether the accident was due to the negligence of his deputies.

The days when all mine accidents were classed as "unavoidable misfortunes peculiar to mining" are over. It is the duty of every mine superintendent to classify every accident under some avoidable cause and seek the remedy against a recurrence.

Illuminating Gas Poisoning

AN article appearing recently in a daily newspaper made a comparison between the percentages of accidental deaths due to gas poisoning in Philadelphia and New York. The accompanying table has been compiled from the statistics of the New York City Department of Health, the midyear census of the United States Census Bureau and the statistics of Dr. Wiley Thomas, chief of the Gas Bureau of Philadelphia.

ACCIDENTAL DEATHS FROM ILLUMINATING GAS POISONING PER 100,000 OF POPULATION

	Philadelphia	N. Y. C.
1912	4.67	6.16
1913	4.04	4.98
1914	3.26	5.57
1915	4.58	5.16
1916	5.09	6.16

A study of the figures will show that in the past five years New York City has averaged 1.25 more deaths per year in every 100,000 of population than Philadelphia. Such a small number of additional accidental deaths is especially gratifying when one considers the congested conditions in New York. The closeness of the figures is even more impressive in view of the cosmopolitan character of New York's population and the large percentage of transient visitors.

Gas Accidents in Workshops

EDITOR, SAFETY ENGINEERING: In one corner of the shop there is a gas furnace on a platform, a babbitt melter and blacksmith tool rack. The gas jets are so close to the tool rack that they may become accidentially opened, gas escape and an explosion caused. To prevent gas escaping and an explosion it is only necessary to make a sheet metal hood and lock it over the gas jets. I desire to call your readers' attention to this because there may be other shops where it may prevent accidents. It is dangerous to have uncovered or unlocked gas jets where regular work is done.

Chicago, April 2. G. A.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

NEW KING BOOKLET

The Julius King Optical Company, New York and Chicago, has just issued a handsome colored booklet devoted to the important subject of "Scientifically Correct Colored Lenses for Industrial Use." The subject is treated in a manner thoroughly understandable by all. The hazard of intense light and glare given off by incandescent gases or metals is considered by some authorities as being greater than that from foreign bodies because of its insidious nature.

The ultra-violet and infra-red rays present in the manufacture and working of iron and steel are of grave danger to the eyesight as they are invisible. This is especially true of the ultra-violet, which tends to destroy animal tissue. The eye is incapable of selecting a color to protect against rays which can not be seen. When these dangerous light rays are present in injurious amounts, in order to safeguard the eyesight against injury it is very important that the correct colored lenses be used.

The Julius King Optical Company has for some years studied the subject of correct color for industrial goggles very carefully. As a result of its laboratory experiments entirely new shades were developed from the older colors.

A complete spectrum in colors is shown in this booklet and the harmful ultra-violet and infra-red rays being invisible are indicated by gray. The various King lenses for removing the harmful rays at different temperatures are shown. By providing the proper color lenses the operator's eyes are not only protected from injury but he often becomes a more efficient producer. The use of cobalt blue glass is strongly condemned in this booklet, because it transmits the harmful invisible rays as freely as clear glass. The use of smoked glass is also condemned for the same reason. Smoked glasses are sometimes furnished for oxy-acetylene work but they should never be used in the presence of dangerous invisible rays. It is highly important that correct lenses be used in electric arc welding.

A copy of this booklet will be sent by the Julius King Optical Company to any industrial official who desires information on this important subject.

PYRENE INCREASES PRICE MAY 1

Mr. C. Louis Allen, president, Pyrene Mfg. Co., in announcing the increase of prices on Pyrene extinguishers, effective May 1 next, has this to say:

"Pyrene has kept faith with the public. During 1916 this company increased its business over 100 per cent over 1915, but percentage of profit on the double business was actually reduced 61 per cent. The Pyrene extinguisher is made from the two articles which have most largely increased in cost—brass and chemicals. The Pyrene extinguisher has 43 brass parts and every one of these separate parts has increased in cost from 50 to 250 per cent. All last year we met the increasing costs of raw material with stoical philosophy.

"A complete analysis was made of our business and selling problems. The figures showed that if the same ratio of profits to business continued in 1917 as in 1916 we would face an actual loss of 72 per cent on the year's gross business. The more Pyrenes we sold the more money we would lose. In the face of these conditions there is only one thing we can do, and that is increase the selling price. We are announcing this increase at this time in order that customers may not be confronted suddenly with the advance price of $10 over the present price of $8. We have been advertising the increased price, which will go into effect May 1, since April 1, and we feel assured that all Pyrene users will appreciate the necessity for this increase and also that we have given ample time for those about to purchase before the higher price is effective."

PROTECTION AGAINST DEADLY AMMONIA FUMES

Herbert Garnett, box 247, Central Station, Toledo, Ohio, has just been awarded a certificate for the ammonia filter which he manufactures. The code of ordinances of the City

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of New York reads in part as follows: "All large refrigerating plants shall be provided with helmets of approved type which will permit the wearer to reach, without suffocation, any part of the refrigerating system. In plants of 25 to 75 tons refrigerating capacity there shall be at least one approved helmet and in plants of over 75 tons there shall be at least two approved helmets."

The test which determined whether "The Garnett Ammonia Filter" complied with this code was conducted in the Municipal Building, New York City, December 7, 1916, and was as follows:

A small air-tight room in the basement of the Municipal Building was filled with dense anhydrous ammonia fumes, and when the officials in charge of the test, were satisfied that no man could possibly live therein, the man wearing the Garnett Ammonia Filter was told to enter and remain inside until called out, if possible. He remained inside 25 minutes, when he was called out, and stated on coming out that he never tasted or smelled the ammonia and could have remained for hours in much denser fumes. The temperature and respiration of the man when he was called out was the same as when he entered, due to the fact that the head is not covered and that the filter is just as easy to breathe through as when a person breathes normally in the open air.

The construction of the Garnett filter is very simple, consisting of three perforated casings containing a purifying material, through which the fumes are drawn when the wearer inhales, the exhalation passing back through the purifying agent. The nature of this agent is such that no deterioration takes place and each filter is therefore guaranteed for three years. As there is absolutely nothing to recharge or replace, the device is always ready for instant use.

Herbert Garnett also manufactures an ammonia proof face mask. The body of this mask is made of two pieces of porous cloth between which is the filtering material, the whole being securely sewed on to a steel wire frame which keeps the mask in perfect shape and flexible enough to fit any face absolutely air tight while protecting the eyes, nose and lungs from the fumes. The filtering material does not need renewing and is guaranteed for three years. For the eyes there is a large celluloid or mica covered opening, permitting perfect vision to all points. In a large chemical plant in Michigan, where 22 of these masks are in daily use, a test was made to prove its merits. In a room eight feet by twelve, on the floor of which had been broken one gallon bottle each of bromine, formaldehyde and aqua ammonia, the resultant fumes being so dense that it was impossible to see one foot ahead, thirty city firemen put on these masks and entered. They remained for twenty minutes without discomfort and stated on coming out they could have remained in the fumes much longer.

The manufacturer invites correspondence from interested parties.

SAFEGUARDING THE WELDER'S EYESIGHT

The use of glasses to protect the eyes of those doing either oxy-acetylene or electric arc welding is essential, as with the workmen looking directly at the brilliant flame a degree of protection is necessitated that has never been needed in the past for any occupational work. For this purpose many different colors and shades have been used but there has been a failure to recognize that although these glasses protected the eyes from the glare of the flame the harmful rays of light that emanate from the flame passed directly into the eyes. These rays known to science as the ultra-violet, at the blue end of the spectrum, and as the infra-red or heat rays, at the red end, are those rays which are not visible to the eye, but which have a most harmful effect. The welding flame has a great many of these rays, particularly the ultra-violet, which is the more harmful, and unless they are eliminated and kept from entering the eyes most harmful results must be expected. As a consequence it follows that lenses used for protecting the eyes of those welding should possess the quality of giving the greatest amount of protection against the ultra-violet and the infra-red rays, and still pass freely to the eye, all such rays as are not injurious. This would give the highest acuity of vision, that is, it would pass the light proceeding from the yellow and yellow-green portion of the visible spectrum, allowing the wearer, in this way, to see all details.

F. A. Hardy & Company, Chicago, Ill., make a goggle which contains lenses that have the property of excluding these harmful rays from the eyes and passing freely all of the yellow rays, thereby affording adequate protection to the wearer. These lenses are made in different shades for different classes of work, according to whether a great deal or very little illumination is required. The protective qualities are present even in the lightest shade in which this lens is made and welders who have been accustomed to using an extremely dark shade of smoked or other color, will not perhaps, at first, appreciate that their eyes are fully protected from all the injurious rays. These lenses are known as the Noviweld lenses.

The mounting of the Hardy Welding Goggle is non-metal. The material of which the eye cups are made is a non-conductor of heat and electricity; non-inflammable and infusible; high in mechanical strength; not affected by temperature below 300 degrees F.; not affected by the moisture of the body, and has no effect upon the skin or flesh. The eye cups are held together in front by a leather connection that is easily changed for either purposes of adjustment or sterilization. They are held together behind by silk elastic bands fitted with an adjustable fastening that is permanent after the glass has once been fitted to the head of the wearer. These elastics are fastened to the eye

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cups through slots in the material itself and can be changed or replaced very easily. No metal is used in this protector, thus insuring absolute protection from electricity. The company is pleased to receive communications from all those interested in eye protection.

SKERRETT FOUR YEARS AS GENERAL MANAGER

John Francis Skerrett celebrates his fourth year as general manager of the Nicholas Power Company on April 1. Mr. Skerrett came to the Power Company in 1913, and during his administration the now famous Cameragraph No. 6B was introduced to the trade. To his efforts is due in great measure the present splendid organization which is so well known to all in the motion picture industry. Prior to his connection with the Nicholas Power Company he was chief of the New York Municipal Bureau of Electricity. He is a man of strong and forceful personality, and the Nicholas Power Company is to be congratulated upon having such a man as Mr. Skerrett at the helm.

"KOVEN" GALVANIZED OILY WASTE CANS

The method in which you dispose of the oily waste in your plant determines to what extent it constitutes a fire hazard. If it is left lying carelessly about, it constitutes a very serious hazard, you will readily see. But if it is placed carefully in a non-burning container then the hazard is greatly reduced.

Such a container is manufactured by L. O. Koven & Bro., 154 Ogden avenue, Jersey City, N. J. The "Koven" oily waste can is made of the best quality of open hearth steel, galvanized. The bottom is made so as to be about three inches above the floor. The shell under the bottom is perforated, the object being to have an air space between the bottom and the floor, so that if the contents of the can should catch fire, the space under the can would prevent the floor from burning. The lid is made so that it will open to less than an upright position. This is done so that it will close when not held open. There is no spring used; the cover falls of its own weight.

This can has been approved by the Underwriters' Laboratories, Inc., and by the Inspection Department, Associated Factory Mutual Fire Insurance Companies of Boston, Mass., and by other insurance exchanges.

PERFORATED SHEET METAL GUARDS

A great many machines in your plant cannot be properly provided with ready-made safeguards, but require guards of a special design. In guarding your machinery, you are seeking a material that will last; that will not interfere with the efficiency of the workman, and that will not detract from the appearance of your plant. Charles Mundt & Sons, 64 Fairmount avenue, Jersey City, N. J., manufacture perforated metal sheets which are excellent for guarding purposes. They are neat in appearance and do not look clumsy. The machine can be seen through the perforations at all times thus obviating the necessity of opening or removing the guard to see moving parts of the machinery. The manufacturers are pleased to receive inquiries regarding their product.

SAFEGUARDING PRESSES

The Corbin Cabinet Lock Company, of New Britain, Conn., the well-known manufacturer of locks and general hardware, manufactures an effective guard for presses and drops.

The Corbin company operates a large number of presses in its own plant, and this guard was designed primarily for use in the company's own factories. It soon attracted the attention of safety engineers, who desired permission to use the guard in their plants. This led the Corbin company to manufacture the guard for marketing purposes.

The construction of the guard is simplicity itself. It consists of a free-swinging rod of light material, so attached to the machine that the trip cannot be operated while the hands are in danger of injury. It touches the arms above the elbows with a pressure that is hardly felt, and does not in any way interfere with the use of the hands or arms, or require a single special motion. This is a noteworthy feature in that it does not antagonize the workmen and they do not, therefore, object to its use. Another feature which deserves mention is that, being attached to a bracket on the machine, it can be instantly removed or replaced. It can be used upon any machine without interfering with the action of the trip or obstructing free access to the dies or other parts.

Although the Corbin company has made very little effort to push the sale of these guards, hundreds of them are already in use and the demand is increasing steadily. If you are interested in safeguarding presses and drops, just write a few lines to the company and it will be pleased to explain, with drawings and blueprints, how the guard can be applied to different machines.

OILY WASTE DISPOSAL

The George H. Priggen Co., 318 Dover street, Boston, Mass., manufactures a fire prevention cabinet which may be used for storing paints, oils, waste, etc. These cabinets prevent the spread of any fire which may start in the waste which is stored in them. The Atlantic Fire Prevention Cabinet is made entirely of galvanized steel; the doors are so constructed that it is practically airtight. The manufacturer will be pleased to send full details upon request.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

ASBESTOS BUILDING LUMBER, PLAIN AND CORRUGATED PATTERNS. Asbestos Mfg. Co., Ltd., Mfr., La Chine, Can.

ASBESTOS BUILDING LUMBER, PLAIN AND CORRUGATED PATTERNS. Keasbey & Mattison Co., Mfr., Ambler, Pa.

CLASS B, BUILT-UP ROOF COVERINGS. Baltimore Roofing & Asbestos Mfg. Co., Mfr., Asbestos, Md.

CLASS C, PREPARED ROOF COVERINGS. Heppes-Nelson Roofing Co., The, Mfr., 4500 Fillmore street, Chicago, Ill.

CLASS C, SHINGLE ROOF COVERINGS. Heppes-Nelson Roofing Co., The, Mfr., 4500 Fillmore street, Chicago, Ill.

CONCENTRIC FILL AND VENT FITTING. Nebraska and Iowa Steel Tank Co., Mfr., 13th and Willis avenue, Omaha, Neb.

ENCLOSED SWITCHES. Detroit Fuse & Mfg. Co., Mfr., 1400 Rivard street, Detroit, Mich.

FRAMES—SINGLE TYPE. Thorp Fireproof Door Co., Mfr., Minneapolis, Minn.

FUSIBLE LINKS. General Fire Extinguisher Co., Mfr., Providence, R. I. Fusible links for use in connection with automatic closing devices for doors, windows, and other automatic devices requiring fusible links.

"GRINNELL, IMPROVED 1903" AUTOMATIC SPRINKLER. Canadian General Fire Extinguisher Co., Ltd., Mfr., 1200 Dundas street, Toronto, Ont.

GRINNELL ISSUE "A" OPEN SPRINKLERS (Window Sprinklers). General Fire Extinguisher Co., Mfr., 275 W. Exchange street, Providence, R. I.

GUARDING DEVICE FOR PUNCH OR STAMPING PRESS. Frontier Meter Works, Mfr., 12 Waverly street, Buffalo, N. Y.; Acme Guard Co., Submitter, 150 Nassau street, New York, N. Y.

HARDWARE—LOCKS. Dearborn Hardware Mfg. Co., Mfr., Chicago, Ill. For Vonnegut Hardware Co., Indianapolis, Ind.

HARDWARE—LOCKS. Bayer, Gardner & Himes Co., The, Mfr., 81-85 Sunswick street, Long Island City, N. Y.; J. Gleckner, Submitter, 894 Forest avenue, Bronx, N. Y.

HARDWARE—LOCKS. Payson Mfg. Co., The, Mfr., 2920 Jackson Boulevard, Chicago, Ill.; Vonnegut Hardware Co., Submitter, Indianapolis, Ind.

HOLLOW METAL FIRE WINDOW FRAMES. Consolidated Sheet Metal Works, Mfr., 661-677 Hubbard street, Milwaukee, Wis. Hollow metal fire window frames and sash for wired glass.

HOLLOW METAL FIRE WINDOW FRAMES. C. F. Haglin, Mfr., 228-232 Lumber Exchange, Minneapolis, Minn. Hollow metal fire window frames and sash for wired glass.

HOLLLOW METAL FIRE WINDOW FRAMES. Metallic Roofing Co. of Canada, Ltd., Mfr., 797 Notre Dame avenue, Winnipeg, Manitoba.

HOLLOW METAL FIRE WINDOW FRAME. Louis A. Ruda, Mfr., 2306-2310 S. Kedzie avenue, Chicago, Ill.

HOSE, RUBBER-LINED. Bi-Lateral Fire Hose Co., Submittor, 326 W. Madison street, Chicago, Ill.

INSIDE HAND-OPERATED DISCHARGE DEVICES. Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

INSIDE HAND-OPERATED DISCHARGE DEVICE. Wayne Oil Tank & Pump Co., Mfr., Ft. Wayne, Ind.

LIQUID FIRE-RETARDING PAINT. Wadsworth-Howland & Co., Mfr., 82-84 Washington street, Boston, Mass.

MORSE FIRE DEPARTMENT CONNECTION CAPS. A. A. Morse, Submitter, Chicago, Ill.

OUTSIDE, HAND-OPERATED, DISCHARGE DEVICE. Western Oil Pump and Tank Co., Mfr., 2437 Kosciusko street, St. Louis, Mo.

SLIDING OR SWINGING, SHEET METAL, FIRE WALL DOOR. Richards-Wilcox Mfg. Co., Mfr., Aurora, Ill.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Wm. A. Cross & Co., Mfr., 533 Quincy street, Chicago, Ill.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. H. W. Goetsman, Mfr., corner Water and River streets, Rochester, N. Y.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Wells & Emerson, Mfr., Cumberland street, Port Arthur, Ont.

TURPENTINE SUBSTITUTE. "No. XVIII SPECIAL." The Sun Co.,Mfr., 1428 So. Penn Sq., Philadelphia, Pa.

TURPENTINE SUBSTITUTE. "No. XCIX SPECIAL." The Sun Co., Mfr., 1428 So. Penn Sq., Philadelphia, Pa.

UNDERGROUND STORAGE TANKS. Milwaukee Tank Works, Inc., Mfr., 146 Clinton street, Milwaukee, Wis.

UNDERGROUND STORAGE TANKS. Nebraska & Iowa Steel Tank Co., Mfr., 13th and Willis avenue, Omaha, Neb.

WELDING MACHINE. Detroit Electric Welder Co., Mfr., 253-255 La Fayette avenue, Detroit, Mich.

FIRE WINDOW FRAMES. Pullman Mfg. Co., Mfr., Rochester, N. Y. Unit sash balances for sliding Type.

HOLLOW METAL FIRE WINDOW FRAMES. Biersach & Niedermeyer Co., Mfr., 216 Fifth St., Milwaukee, Wis.

HOLLOW METAL FIRE WINDOW FRAMES. Dillon Co., W. E., Mfr., 183 George St., Toronto, Can.

HOLLOW METAL FIRE WINDOW FRAMES. Moeschl-Edwards Corrugating Co., The, Mfr., Covington, Ky.

INSIDE, HAND-OPERATED, DISCHARGE DEVICES. Crescent Mfg. Co., The, Mfr., 771 Mather St., Chicago, Ill.

INSIDE, HAND-OPERATED, DISCHARGE DEVICE. Western Oil Pump & Tank Co., Mfr., 2437 Kosciusko St., St. Louis, Mo.

"MALTHOID CEMENT PAINT." The Paraffine Paint Co., Mfr., 34 First St., San Francisco, Cal.

OUTSIDE, HAND-OPERATED DISCHARGE DEVICE. Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

SASH LOCKS FOR SLIDING WINDOWS. Russell & Erwin Division, American Hardware Corp., Mfr., New Britain, Conn.

SLIDING OR SWINGING, SHEET METAL FIRE WALL DOOR. Consolidated Sheet Metal Works, Mfr., 661 Hubbard St., Milwaukee, Wis.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Minnesota Roofing & Cornice Works, Mfr., 133 Twelfth St., St. Paul, Minn.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR. Norman-Seton, Inc., Mfr., Winfield, L. I., N. Y.

SWINGING, HOLLOW METAL, EXTERIOR WALL DOOR. Central Metallic Door Co., Mfr., 2412 W. 22nd St., Chicago, Ill. National Automatic Door Co., Chicago, Ill., submitter.

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SAFETY ENGINEERING

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Carelessness, or Lack of Concern?

Is the Carelessness of Employes Responsible for More Accidents than Lack of Concern on the Part of Employers?

A Conversation for SAFETY ENGINEERING *by Walter Greenwood, Safety Engineer, Carnegie Steel Company, Youngstown, Ohio; Victor T. Noonan, State Director of Safety, Industrial Commission of Ohio, Columbus, Ohio; and Roger W. Straus, Secretary, Labor, Safety and Welfare Department, American Smelting & Refining Company, New York City*

MR. GREENWOOD: The assertion is often made that carelessness is responsible for a very high percentage of accidents. Utterances of the press and of speakers leave us to presume that this charge applies to employes principally. The percentage is most often placed at 75, frequently at 80, 85 and 90. No one was ever bold enough to say that the carelessness was partly chargeable to employers, or to give the proportionate share each (employes and employers) should bear.

The seeming inconsistency of some of the claims has prompted me to analyze many accidents, representative of various classes, and the result convinces me that there are no just grounds for placing so high the estimate of the carelessness of employes.

One may be willing to admit that a high percentage of accidents could be prevented if the matter of avoiding accidents could be the predominating issue, engrossing the mind constantly; yet the environment that prompts our actions is just as much a factor in acts where accidents result as in acts where our comfort and welfare are concerned. If an accident occurs through mistaken judgment, or because of a necessarily preoccupied condition of mind, it cannot be charged to carelessness. Would we say that an inexperienced "arrival" from a foreign land was careless because his work was done without regarding a possible danger he could not understand for want of knowledge of some physical law that had not been explained to him?

It has been asserted that the chance-taker is a careless person. There are numerous reasons to justify taking chances, in certain cases, where, if an accident happened, the chance-taker probably would be called careless. The employe gets to feel that the employer demands results—the standard is past records where caution did not and could not get first consideration. How many persons know the value of one minute in the operations of any large unit of an industrial plant or public utility? The employer does, and usually the employe does. A few seconds delay at a critical time might stop an entire plant—probably with some loss, possibly with great loss. Again a disaster might occur through hesitation. Is it surprising that the employe is ambitious to make good in the matter of efficiency, that he will go the limit in setting his judgment highest in

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the performance of his work? If the crew of a railroad train or a street car fails too frequently in getting their train or car over the road *on time* they must explain. If cautious movement is offered as an excuse they are met with the statement: "The standard has been proved, others are complying with it without accidents and *you must.*"

These considerations seem to justify the chance-taker, and they should, except in cases where he is moved by a spirit of bravado or willful, malicious defiance of prescribed regulations without a pretext of justification.

I would divide chance-taking employes into two classes, those that act from worthy motives, and those that are defiantly careless. Chance-taking employers might be divided into several classes: the inconsiderate, the apathetic, the ignorant, the greedy, the desperate; perhaps every chance-taking employe could be classed under one or another of these headings. The proportion these divisions bear to one another can be determined only by careful analysis. If a comparison between two divisions is to be considered, then only the willfully careless of the first division should be included.

It is hard to present an example that will cover all phases I would like to illustrate, but I will present some of the particulars of one actual occurrence that embodies the chief characteristics of most cases where carelessness is charged. Tom Brown, catcher on a bar mill, was caught by a loop, drawn in against the rest bar, and his legs were seriously mutilated. It was a freak performance on the part of the piece in the rolls, together with the failure of a safeguard, that permitted this accident to happen. Perhaps Tom should have known that the safeguard could fail, yet his occupation was one that required great skill, one that for a period of time must absorb his entire attention. It would be a radical assertion to say that Tom was careless, though if he and his associates in the work had been full of care, to the exclusion of every other thought, the accident might not have happened.

The word employer includes everybody in authority from the head down. It was possible for the employer to know that the safeguard for Tom's protection was not substantial; it was possible for him to see the other defective condition responsible for the performance of the bar. Conceding the possibility of knowing these facts, one can charge the accident to any or all the classifications of carelessness in the second division.

Usually the carelessness ascribed to the employer is found somewhere down the line below the head, and the head might be excused if the rule did not apply that a commander is not excusable for the loss of his ship because he did not know.

Charging the blame for accidents to the carelessness of employes, a general practice, may be too general. If not true it should be denied, because its tendency is to create a feeling of resentment in the minds of employes, holding in check the spirit of co-operation, which should always be promoted. However, there may be a widespread feeling that alleging the employe's carelessness, even though exaggerated, may have the effect of making employes more careful.

MR. NOONAN: One of Mr. Greenwood's most important points is the statement that charging the blame for accidents to the carelessness of employes, as a practice, may be too general. I will go a step further and say that it is a serious mistake to say that a great part of the responsibility for accidents should be charged up to the carelessness of workmen.

Carelessness is only one of numerous causes of accidents. If, therefore, some accidents are caused by carelessness, the responsibility for that carelessness must be shared by employer as well as by the workman.

My work in Ohio brings me in contact with at least 20,000 workshops, mills and factories. In all this vast number *the plants that are actually succeeding in reducing accidents at the present time are the plants where employers have assumed personal responsibility for every accident occurring,* who themselves have set the example to their employes of

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personal carefulness and of personal interest in the safety and welfare of all those working in their plants.

In plants where I find many accidents occurring *I frequently discover that the employer is not personally interested in accident prevention.* It is true, as Mr. Greenwood points out, that occasionally the carelessness which is charged up against the employer should be charged up against the superintendent or his foreman. The foremen and superintendents represent authority—they represent the employer. Therefore, whatever mistakes these officials make in matters of safety, the employer is responsible for.

I find it very much easier to interest workmen in safety when their employers are setting the example, and I can say that it is a hopeless task, from my point of view, for me to attempt to interest a thousand men in a factory in accident prevention work if the men know that their employers do not care.

Employers should set the example of carefulness, because they have the means, the power and the authority to establish safety in their plants to guard dangerous machinery and to employ careful workmen. The employer, too, has the power and authority to establish shop discipline; in other words, to have certain rules regarding safety and safe practices in his workshop, and it is up to him to see that every man along the line is complying with such regulations. This brings up the important question of the necessity of Shop Discipline as a Factor in Accident Prevention. which I shall be glad to discuss at another time.

MR. STRAUS: Mr. Greenwood's and Mr. Noonan's statements on the relative responsibility of the employer and the employe are extremely interesting. I agree absolutely with both of them—that often an accident is charged to the carelessness of the employe when, in reality, it is largely up to the employer or his agents. In a plant or a company where no systematic work nor intelligent thought is given to accident prevention, every accident is chargeable to the employer's account, regardless of whether or not the particular accident could have been prevented by reasonable care on the part of the injured man or a fellow employe, because the necessity for taking such care had never been properly presented to him.

On the other hand, take a company where the directing heads have constantly done all they could to forestall accidents, where systematic inspections and educational campaigns had been and are being carried on; then if an employe (either by himself or some fellow workman), in violation of a well defined, thoroughly advertised and enforced rule, comes to grief, the accident must be considered up to the employe. That does not mean that the employer should shrug his shoulders and not study how a repetition can be prevented, but it does mean that the responsibility for that accident is not at his door.

I should hazard a guess, based on reports of accidents investigated, that in a plant or company properly organized for carrying on safety work, certainly not more than 25 per cent, probably nearer 15 per cent, of the accidents are clearly up to the employer, while 30 per cent to 50 per cent are clearly up to the employes, leaving from 30 per cent to 40 per cent in the twilight zone of joint responsibility. By this is meant that if the company had been a little more intelligent and far-seeing in its efforts the chances of the particular accident occurring could have been greatly reduced, while, on the other hand, if the man had followed well defined and straightforward advice, in all probability the accident could have been prevented.

There remains a very small percentage of about 5 per cent of so-called unavoidable accidents, which are due to inexperience, unavoidable lack of knowledge or experience on the part of both the employer and the employe; therefore, this class really falls as a subdivision under the head of Divided Responsibility. (To my mind there is no such thing as an absolutely unavoidable accident, except in so far as, with the then knowledge or experience, there was no way of foreseeing the accident.)

To sum up, therefore, it would seem to me that:

1. In a plant or company where no systematic, intelligent effort for accident

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prevention has been made *all accidents are chargeable to the employer.*

2. In a plant or company where such efforts have been and are being made the following percentages of *division of responsibility* are found, the per cent differing with efficiency of organization, etc.:

	Per Cent.
a. Clearly up to the employer or his agents	15 to 25
b. Clearly up to the employe	50 to 30
c. Divided responsibility	35 to 45

I would like to have the views of others on this classification, both as to the principles involved and the percentages I have estimated, as my figures are not given as final but merely as a basis for consideration and to illustrate the main thought.

MR. GREENWOOD: The percentages given by Mr. Straus charge a proportionate share of carelessness to employers or their agents as well as employes. They do not agree with my estimates in cases where companies have made proper effort to prevent accidents by supplying mechanical safeguards, instructing in safe methods and trying to enforce them. However, our methods of estimating being so largely arbitrary, varying with viewpoints, conditions, etc., which prevent uniformity of method for classification, his estimate might be more acceptable than mine to persons who have given the subject deserving thought.

I am convinced that carelessness on the part of employes (that is not excusable on some grounds, as previously remarked) is relatively much lower than the figures given by Mr. Straus in division b. Another division of the classification should be made that would represent the carelessness where a justifying excuse might be offered. This, too, should reduce the relative percentage representing "divided responsibility," given in division c. My estimate of the percentage figures would read, a 25, b 25, c 20 and d, justifying excuse claimed, 30.

While we may never agree on an equitable basis for classifying accidents under the headings that designate who is responsible, I am glad to see all parties to this conversation agree that we should not continue to saddle the employe with all but an insignificant part of the responsibility.

The Spirit of Safety

WE have heard and read considerable of the spirit of safety but it is probable that all have not caught its real meaning and significance, says *The Gas Industry.*

Why is this activity making a place for itself which ranks all others? Because it is a common basis of thought and purpose. It is inspiring men to do things for their fellow men and their families, to render an unselfish service and to recognize man-value in its full measure.

"Help the other fellow." That is the spirit of safety, and in the end it spells success. It brings out the best there is in every man and strikes at the very source of poverty and misery, of oppression and gloom. It is a spirit that draws all men together by a common bond. It is reflected in the daily work and home life of every man who is endeavoring to be guided by this spirit of safety. It shows itself in more efficient work and better working conditions; in happier faces and more cheerful surroundings; in brighter homes and more contented wives and mothers, because of the assurance of the safety of husbands and sons; in better fed, better clad and better educated children.

Heed, then, the spirit of safety. Be careful of yourself; thoughtful and considerate of your fellow men; kind and provident in your home. In these things lie the greatest achievements of right purpose and true success.

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Fire Drills in Public Schools

By H. E. Plummer

Inspector of Buildings, Portland, Me.

Editorial Note: Mr. Plummer says that as the equalization of the records of the individual schools was made in a more or less unusual manner, the method may prove interesting to public school authorities in other cities. The problem of safe exits for buildings has not yet been worked out in rules sufficiently definite. It is Mr. Plummer's opinion that the account given below may be helpful in a discussion of that subject

THE problem of making the public schools safe for children has occupied a considerable part of the thought of school boards, school architects and of thinking people generally, for nothing is dearer to the normal person than the welfare and safety of the children of his flesh and blood.

The American people are known as a people with a mania for making laws upon every conceivable pretext, so it is not at all strange that there are many laws relating to the safety of school children. Some of the laws commonly placed on the statute books require among other things that buildings be of fireproof or fire-resisting construction, stairs and doors to be of a certain width or number, the heater room to be fireproofed, the basement to be provided with automatic sprinklers, and a regular fire drill.

There is a difference of opinion as to the real value of a fire drill if an emergency actually occurs. Some people think the children in a flimsy frame building are safe. Others think that in time of emergency the children are apt to become excited and fail to maintain order; the drill then becomes entirely useless. It is not necessary to debate which contention is correct. In Portland, although a fire drill is maintained, other measures of safety are not forgotten, so the advocates of both methods of providing safety are given consideration. The building code of Portland requires, for example, that schools over two stories in height must be of fireproof construction. The school board has for several years required that fire drills be maintained, and these drills have been developed to a high degree of efficiency. For the purpose of maintaining and increasing this efficiency, a silver cup was offered by J. P. Jaeger (owing to the interest aroused by the public safety commission, of which H. P. Coffin is the chairman), to the school making the best record for three years, not necessarily consecutive. The first contest for the cup was held in 1915. The award was made to the school completing the drill in the least time, without taking into consideration any other factors. At the conclusion there was some dissatisfaction expressed as some of the schools with a large number of pupils and a small number of exits felt that the schools with a small number of pupils and a relatively large number of exits had too great an advantage for the contest to be a fair one.

The public safety commission, recognizing the need of a more equitable basis for conducting the contest for the drills, considered the giving of handicaps to equalize the schools which vary so greatly in the number of scholars, in the number and size of exits, and in the distance to be traversed by the pupils in making an exit. After consulting with the writer, it was decided to determine as nearly as possible, on a scientific basis, the shortest time in which the exit could be made for each school separately and then rate the school drill on a percentage basis in comparison with the scientifically computed minimum time.

It is interesting to note at this time, notwithstanding the great range of scientific investigation, there is but little information to be obtained concerning the movement of people in crowds. This is all the more remarkable when it is recalled that disasters have occurred for

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centuries as a result of people crowding together. The writer has been interested in the subject of the movement of crowds for some years, has made some experiments and observations from which some more or less general laws have been derived.

In 1916 the contest drills for the grammar schools were held in June, just before the close of school. A record was kept of the time in seconds that elapsed from the sounding of an alarm until the last pupil left the building, the number of pupils, the number of exits, the width of exits, the greatest distance traveled in a horizontal direction, the greatest number of steps to be taken in going down stairs, the number and width of stairs, the deportment of the pupils, the order maintained by pupils, the work of the monitors, and any special events. Under the general head of discipline were grouped three items: Deportment, order and work of the monitors, with a relative weight for the total of 30 points in 100. All other phases of the drill were grouped under the general heading of exit efficiency to which a relative weight of 70 points in 100 was given. The drills were conducted under the direct supervision of the public safety commission, which devoted a number of days to the work.

It may be of interest to know how the exit efficiency records of the various schools were equalized, so a brief explanation will be given, together with the calculations for two of the schools. The minimum theoretical time in which the pupils of a school could be expected to get out of the building was calculated, the actual time compared with it, and expressed as a percentage. The rate of travel of a person walking at a moderate pace is about 5 feet per second or a mile in 17½ minutes. As in the drills it is desirable to have the exit made in a rapid manner, the rate of travel in a horizontal direction is taken at 8 feet per second. This is almost twice the usual rate. The ordinary rate of travel down stairs is about two steps per second, or more nearly equals one foot vertical drop per second. As the rate of travel is considered from a theoretical basis to be about twice the normal rate, it is taken to be four steps per second. If the pupils are walking through a doorway in one line, they will pass through at the rate of two per second. The theoretical efficiency of the exit doors in the schools, which are all about 6 feet in width, is 8 pupils per second, as there are 4 lines of pupils which can use the door if it is to be used with a maximum of efficiency. This rate is equal to 480 pupils per minute as the theoretical efficiency of one 6-foot exit door.

Now, to make clear the use of these theoretical standards, two examples of actual schools will be worked out.

CHAPMAN SCHOOL

No. of pupils.....350
No. of exits..... 2
No. steps in exit stairs..... 28
Horizontal dist. traveled in making exit .....111 feet
Actual time taken for drill..1 min. 15 sec.
Theoretical time for an exit:
28 steps divided by 4 = 7 sec. to come down steps
111 feet divided by 8 = 14 sec. to walk horizontally
Allow for starting... 2 sec.

Total ..... 23 sec. for 1 pupil to make an exit.

The 350 pupils are divided into two groups of 175 each; one for each exit. There are 4 lines to each exit or 44 pupils for each line. It takes each line 44 divided by 2 or 22 seconds to pass through the exit doorway.

Total time for 1 pupil to make exit ..... 23 sec.
Plus time for 350 pupils to pass through exit doors..... 22 sec.

Or ..... 45 sec.

Now as the actual time was 1 min. 15 sec. or 75 sec. and the theoretical time is 45 sec. the exit efficiency is 60 per cent on a basis of 100 points for exit efficiency (maximum) or 42 points on a basis of 70 points (maximum) for exit efficiency.

The discipline efficiency was marked by the public safety commission as follows: Deportment 10, order 10, monitors 5; a total of 25 points, with a possible maximum of 30 points.

The total points of the Chapman

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DATA AND RATINGS OF THE VARIOUS SCHOOLS.

Schools— West Side.	Discipline 30 Points Max.				Exit Efficiency 70 Points Max.							Remarks.
	No. of Pupils.	Deportment.	Order.	Monitor.	Points.	No. of Stairs.	No. of Exits.	Dist. Trav. Feet.	Time.	Points.	Music.	Tot. Pts.	
Chapman	350	10	10	5	25	28	2	111	1.15	420	Piano	670	
Davis	280	10	10	10	30	28	5	84	.40	647	No	947	
Couch	660	10	10	7	27	30	6	200	1.10	550	Graf.	820	Cripple left in rm.
Boys Trades	290	10	10	8	28	32	4	120	.58	362	No	642	
Girls Trades	356	10	3	3	16	90	2	177	2.03	393	No	553	
Ladd	750	10	10	10	30	32	4	105	.46	700	No	100	
Ainsworth	225	10	10	10	30	30	4	57	.51	356	No	656	
Shattuck	800	10	10	7	27	51	4	75	1.15	457		727	2 child. left
Failing	682	10	10	10	30	54	6	117	1.00	490	Yes	790	
Holman	325	10	10	10	30	43	4	110	1.00	443	Drum	743	
East Side.													
Holladay	516	10	7	10	27	43	9	63	1.10	315	No	585	2-rm.; 4 ft. strs. Buzzer ea. rm.
Irvington	585	10	7	10	27	46	4	53	1.02	395	No	665	Boy has to tch.
Eliot	510	10	10	10	30	43	6	35	.50	364	Drum	664	
Thompson	670	10	10	10	30	28	7	94	1.16	285	No	585	
Shaver	410	10	10	10	30	28	6	64	.58	314	Yes	614	3-story bldg.
Albina Home	750	10	7	10	27	44	5	63	1.29	283	No	553	
Highland	640	10	10	10	30	48	7	36	1.15	280	Yes	580	Obstrs. for aisles
Stephens	650	10	10	10	30	29	3	130	1.28	414	Piano	714	Music
Brooklyn	410	10	7	10	27	31	8	102	2.29	140	Drum	410	Drum 30 sec.
Hawthorne	560	10	10	10	30	45	5	60	.60	408		708	
Sunnyside	700	10	10	10	30	45	9	110	.48	332		632	
Glencoe	540	10	10	10	30	45	7	90	.58	410		710	
Mt. Tabor	360	10	10	10	30	46	5	100	.37	662		962	
Montvilla	575	10	10	10	30	..	6	126	.46	578		878	Fire Squad
Glenhaven	135	10	10	10	30	45	3	65	.47	402		702	
Rose City	475	10	10	10	30	40	4	145	.50	630		930	Hose Team
Fernwood	350	10	10	10	30	37	3	140	1.00	513		813	
Linnton	146	10	10	7	27	33	3	29	.38	368		638	
Central	423	10	10	10	30	31	2	123	.48	568		868	
North	207	10	7	10	27	26	2	43	.59	320		590	
Kenton	223	10	10	10	30	45	3	42	.44½	440		740	
Peninsula	350	10	10	10	30	47	7	81	1.01½	208		508	
Portsmouth	415	10	10	10	30	34	4	81	.73	326		626	
Llewellyn	198	10	10	10	30	45	4	90	.45	481		781	No Music
Sellwood	690	10	10	10	30	50	7	60	1.20	241	No	541	No Music
Woodstock	308	10	10	10	30	42	3	30	.45	404	No	704	No Music
Clint. Kelly	675	10	10	10	30	48	6	90	1.05	307		607	
Richmond	640	10	9	10	29	44	5	120	1.06	317	Drum	607	
Arleta	700	10	10	10	30	47	8	52	.45	481		781	Triangle
Lents	650	10	9	10	29	49	7	100	1.03	412	Yes	712	Music
Woodmere	550	10	8	8	26	45	3	90	1.12	456	No	716	No Music
Hoffman	317	10	9	10	29	48	3	60	.41	529	No	558	
Buckman	465	10	10	10	30	30	7	90	.52	580	No	880	26 deaf
Vernon	625	7	10	7	27	46	4	53	.49	571	No	841	Talkg. in line
Kennedy	225	10	10	7	27	..	7	36	.42	183	No	453	
Woodlawn	560	10	10	10	30	58	5	74	.55	509	No	809	
Ockley Green	681	10	10	10	30	47	6	30	.52	431	No	731	

School are the sum of 25 points for discipline and 42 points for exit efficiency, or 67 points final rating.

LADD SCHOOL

No. of pupils.....750
No. of exits..... 4
No. steps in exit stairs..... 32
Horizontal dist. traveled in making exit .....105 feet
Actual time taken for exit drill 46 sec.

Theoretical time for exit:

32 steps divided by 4 = 8 sec. to come down steps
105 feet divided by 8 = 13 sec. to walk horizontally
Allow for starting... 1½ sec.

Total..... 22½ sec. for 1 pupil to make exit.

Dividing the 750 pupils by 4, the number of exits, the number for each exit is found to be 187. As there are 4 lines to each exit, there are 47 pupils per line. It takes each line 47 divided by 2, or 23½ sec. to pass through the exit doorway.

Total time for 750 pupils to make an exit:

Time for 1 pupil to make an exit ..... 22½ sec.
Plus time for 750 pupils to pass through the 4 exit doorways. 23½ sec.

Or a total time of..... 46 sec.

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Now the actual time required for the exit drill was 46 seconds, and the theoretical time is 46 seconds, so the exit efficiency is 100 per cent and counts for 70 points (the maximum) for exit efficiency.

The discipline efficiency was marked by the public safety commission as follows:

Deportment	10
Order	10
Monitors	10
or a total of.....	30 points,

the maximum possible.

The total points of the Ladd School are the sum of 30 points for discipline and 70 points for exit efficiency, or 100 points final rating.

The data and ratings of the various schools are given in the table on the preceding page.

It was noticed that in some of the schools the stairs or exits were not utilized to the maximum of efficiency; for example, a stair that was of ample width to accommodate four lines of pupils was utilized for only two lines. In some cases the monitors were very quick to open the doors to the class rooms and the exit doors, and in other cases the teachers were compelled to do this because of the neglect or slowness of the monitors. In several of the schools where there were cripples, the work of the monitors in getting them out quickly and easily was noteworthy.

After holding the drills this year, the public safety commission gave careful thought to the subject of improving the drills for the next school year. The commission decided to recommend that there be a uniform signal given for the drills. In some schools a gong is used, in others a large dinner bell or hand bell, and this makes for confusion. The commission also recommended that running of the pupils be not permitted, except for the monitors. It is considered more or less dangerous for the pupils to run when coming out in compact, dense lines, as one pupil falling might trip up a large number and a serious accident result. The commission hopes to make the basis of calculation for the drills still more exact and scientific for the next school year. With the information at hand, the present basis is considered very satisfactory. This article is written in the hope that it may be of value to others who are interested in schools or in the "Safety First" movement.

The Psychology Side

"IT requires great patience and much persistence to convince the public that prevention is better than cure," says the annual report of the Public Safety Commission of Chicago and Cook county. "We cannot quickly awaken enthusiasm over fires that are not kindled, waters that have not drowned, collisions that have not occurred or lives not lost. The same people who are moved to instant sympathy and generous giving to relieve the suffering and need which follow a great disaster are apathetic when appealed to for aid in preventive measures." This is a concise statement of the great difficulty in the safety movement which can be overcome only by publicity getting results.

Texas Accident Record

THE Texas Employers Insurance Association has issued a 12-page booklet entitled, "Safety: Organization and Education," which includes a good working outline of steps to be taken in the instigation and promotion of a safety campaign in a shop. The methods are those endorsed by the National Safety Council based on the experience of industrial organizations. The preface states: "The State of Texas is far down the scale in accident prevention. Its record is bad. Its industries pay a good round sum for their insurance and are due to pay more if conditions are not improved. The answer is organize and educate." The booklet concludes: "In case of accident save the man."

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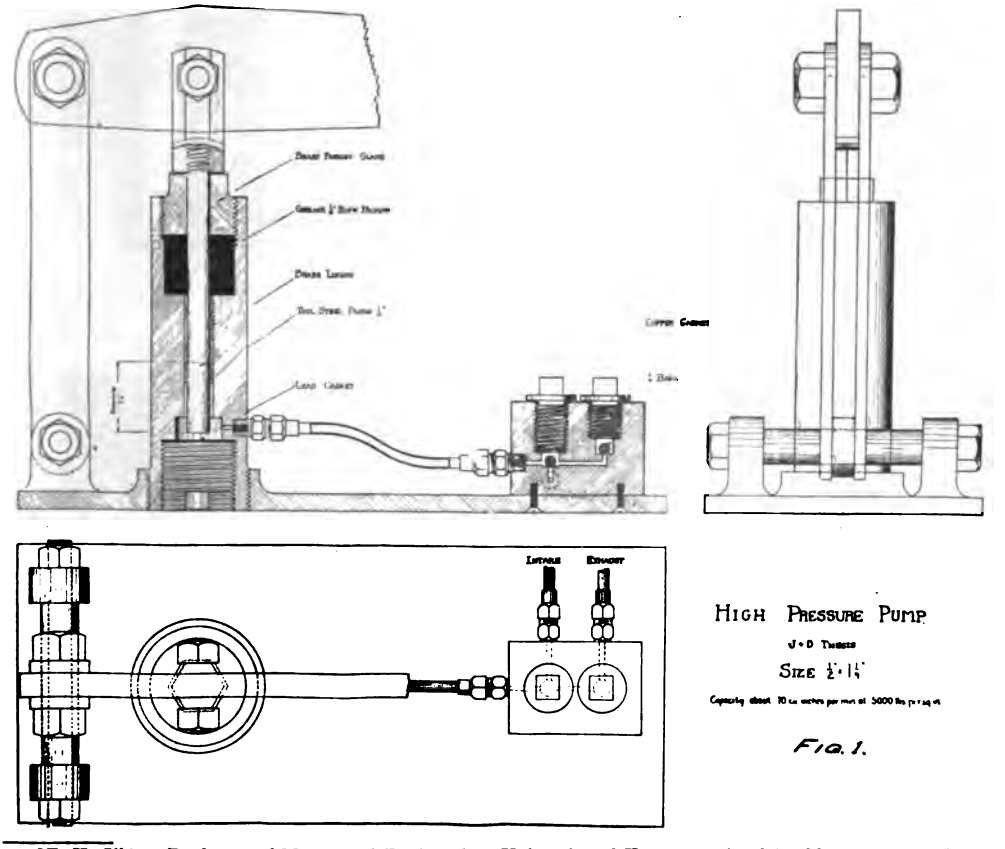
Welded and Screwed Connections

Relative Strength of Oxy-Acetylene Welded and Screwed Pipe Connections as Shown by Hydraulic Pressure Tests

THE interest created by an article that appeared about a year ago giving a report of tests of oxy-acetylene welded pipe connections and screwed pipe connections tested under tension and compression, and the desire of readers for further information regarding the relative strength of welded and screwed pipe connections, encouraged the experimenters* to carry on a second series of tests.

These tests were conducted in the machine construction laboratory of the University of Kansas and had for their purpose the determination of the relative strength of welded and screwed connections in steel pipe of various sizes when subjected to internal hydraulic pressure.

The pipe samples, which were cut from standard black steel pipe, were from the same stock and hence probably of uniform quality. The welded specimens were made by operators of the Oxweld Acetylene Company, Chicago. The screwed connections were made up with malleable iron couplings and tees by expert pipe fitters. The pieces for the butt welds were cut at an angle of about 60 degrees in a pipe cutting machine to get the necessary "V" groove for welding. The "T" welds



HIGH PRESSURE PUMP
J-D Tests
SIZE 1½-1¼"

FIG. 1.

*F. H. Sibley, Professor of Mechanical Engineering, University of Kansas, assisted by Messrs. Maris, Ruth, Schooley, Jesperson, and Dryden.

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were made by cutting a hole in the run and butting the outlet against the run. The ends of all the specimens were sealed by welding in plugs or disks made from boiler plate punchings. Two of these disks are shown at the bottom of Fig. 3.

The specimens were subjected to pressure by means of a small hydraulic pressure pump, Fig. 1, which was made especially for this work. The specimen under test was placed about 25 ft. from the pump and connected to it by means of a ½ in. copper tube. A pressure gage with a check valve opening toward the gage was placed between the pump and the specimen. The check valve was necessary to steady the pressure in order that satisfactory readings could be obtained because some of the samples carried pressures greater than 5,000 lb. per sq. in. before failing.

The illustrations show several of the specimens tested and their modes of failure.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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HYDRAULIC PRESSURE TEST OF OXY-ACETYLENE AND SCREWED PIPE CONNECTIONS.

Size Pipe In.	Type Joint	Pressure at Failure Lb. per sq. in.	Maximum Pressure Lb. per sq. in.	Nature of Failure	Condition of Weld
2	Welded "T".....	4,400	4,400	Tube seam split.....	O. K.
2	Welded "T".....	2,200	2,200	Leak in tube seam.....	O. K.
2	" "	4,750	4,750	Tube seam split.....	O. K.
2	Screwed "T"....	2,350	2,750	Sand holes in fitting.....	.....
2	" "	500	2,000	Sand holes in fitting.....	.....
3	Butt Weld.....	....	5,300	.....	O. K.
3	" "	4,950	4,950	Tube seam split.....	O. K.
3	" "	....	4,250	.....	O. K.
3	Coupling	3,950	3,950	Coupling split	.....
3	"	3,400	4,400	Leak in coupling.....	.....
3	Welded "T".....	....	3,500	.....	O. K.
3	" "	....	4,250	.....	O. K.
3	" "	....	3,505	.....	O. K.
3	Screwed "T"....	350	2,700	Sand holes in fitting.....	.....
3	" "	300	3,100	Sand holes in fitting.....	.....
4	Butt Weld.....	....	5,100	Pipe bulged	O. K.
4	" "	....	3,250	.....	O. K.
4	Coupling	300	3,000	Leak at threads.....	.....
4	"	750	2,600	Leak at threads.....	.....
4	Welded "T".....	3,850	5,100	Leak in weld.....	Leaked
4	Screwed "T"....	1,000	1,950	Sand hole in fitting.....	.....

Welded 2 and 3-inch specimens are shown in Fig. 2. These failed by splitting along the longitudinal seams of the pipe, the split stopping at the welded section. The 4-inch welded specimens in Fig. 3 bulged under the high pressure but did not fail in either the weld or the pipe seam.

The mode of failure of two of the screwed connections are shown in Fig. 4. The bursting pressures for the screwed connections were way below that of the welded specimens and all failed in the fitting. Great difficulty was experienced in testing the specimens made up with screwed fittings because sand holes developed and the water leaked through the castings to such an extent that it was almost impossible to reach the point of rupture. Fig. 5 shows one of the screwed "T" specimens under test and illustrates clearly the leaky condition just mentioned.

Examination of the data given in the table shows that in only one case was there failure in the weld and that was merely a leak which did not develop until 3,850 lb. per sq. in. pressure was applied. This brings out the point that while leaks are much less likely to occur in welded than in screwed connections they are the principal cause of difficulty. Therefore, pipe lines that are to be subjected to high pressure, if properly tested for leaks when installed, should give no trouble under service.

The results of these tests bear out the conclusions given in the previous series, namely:

a. The strength of a welded pipe connection is practically the same as that of unwelded pipe. By slightly building up the weld it can be made stronger than the rest of the pipe.

b. The strength of the welded pipe connection is very much greater than that of the malleable iron screwed fittings.

c. Although a careless or inexperienced operator might produce a leaky joint, nevertheless, if the pipe line is tested for leaks when installed it should give no difficulty in service.

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Explosions in Enameling Ovens

AS the result of a number of serious explosions in enameling ovens, both gas and electric, throughout the country, the Ford Motor Company has carried on a series of experiments in an effort to find some reliable means of preventing such explosions.

Some time ago the Ford Company had a number of more or less severe explosions in its large pipes used in supplying air to the gas furnaces. It was found that these resulted from gas backing up into the air pipes, even though supposedly adequate check valves had been installed at the proper points.

To overcome these explosions, paper drums were placed over suitable heads at frequent intervals along the main pipe lines and these were found to provide sufficient outlet to prevent any serious consequences in case of explosion.

The success of this plan led to its trial on the ovens. Two holes, each 3 feet square, were cut in the top of a large enameling oven and ¼-inch plates placed over the holes. The oven was then filled with gas and exploded with an electric spark. The plates were blown 30 feet into the air, while the small latch holding the doors shut was broken and the doors hurled back with great force. This explosion proved that the holes in the top of the oven were not sufficiently large to take care of the explosion without damaging the oven.

Result of test with two vents, each 3 feet square.

Result of test with entire top loose.

REMEDY FOUND IN LOOSE TOP

To correct that difficulty the top was loosened, but still allowed to rest in its usual position. The doors were strongly secured. Several explosions were made and the top lifted from 3 inches to 15 inches, varying with the force of the explosion. The top weighed approximately 7 pounds to the square foot. None of these explosions injured the oven, while the pressure on the doors was not heavy. With the top fastened down, however, and all other outlets stopped, the oven would have been wrecked.

These experiments were all carried out under the direction of the Ford factory superintendent and proved so satisfactory that he ordered all Ford enameling ovens changed so that, in case of explosions, the tops will lift and dissipate the force of the explosion without damage to the ovens.

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American Museum of Safety Medals

The Awards for 1916

THE awarding of the 1916 American Museum of Safety medals took place on April 25 at a luncheon given by the museum, as a substitute for the usual annual banquet arranged for April 19. Owing to a state of war existing the banquet was canceled.

President Arthur Williams made the introductory remarks. Hon. Joseph H. Choate spoke briefly. Prof. F. R. Hutton, vice president of the American Museum of Safety and chairman of the Jury of Awards of the museum, spoke as follows in conferring the medals:

It has become a sort of custom that the representative of the board of trustees of the American Museum of Safety should, year by year, preface the ceremonial of the conferring of its achievement medals by a brief word as to the philosophy of the museum in inviting the gift of a medal and in perpetuating its award.

This year I want to emphasize the absolute or non-competitive character of these medals, in the sense that they are not sought in rivalry, in the "downing of the other fellow" or to secure a recognition at the expense of the other man.

For, all down the ages there have been two taunts which jealous envy and cynic evil have been prone to cast at successful and fortunate good. The first is as old as recorded literature, and emerges when the principle of Evil in the world in the Hebrew epic of Job taunts the man who seeks good and pursues it, by sneeringly asking "Doth Job serve the principle of Good *for naught?*" The other belongs to a more modern and a material age, and is Lord Walpole's sneer, "Every man has his price." Neither of these is true in all senses; yet both have interpretations in which they are in accord with fact. Rewards do come (but not necessarily in money profit or material form) to those who follow high ideals of altruism, of service, of self-sacrifice; but if the ideal is sought outwardly and not inwardly for its own sake—for the reward, and not for the achievement—the quality of the achievement dwindles toward the vanishing point. It is not true that every man has his price in the Walpole sense, if that price is expressed in dollars only; but it is true that every man can be induced to take action if you can present a motive lofty enough in its spiritual aspects for it to be impossible to refrain.

So the trustees of the museum want to have these medals stand in their true perspective and be appraised for their real function. They are to make it clear to a busy and perhaps otherwise uninterested public that quietly and without ostentation, some persons have been achieving in the direction of safety and sanitation and fellowship; and such an assembly and its ceremonial of awarding medals may serve like the sign at a busy grade crossing of a railway, to ask the self-centered and indifferent, to "Stop. Look and Listen" to what he might otherwise pass by, unnoticing. The museum has five medals, the gifts of friends. I take them in their historical succession.

The first is the *Scientific American* medal. Its award is for the most efficient safety device exhibited in the collections and exhibits of the museum in a recency of years. In 1916, this goes to the Pullman Company of Chicago, for its exhibit of the Dean End-Frame for the railway coach, in which a massive structural steel member is bent into a letter U to form the vestibule, and so installed that the danger in collision is minimized or eliminated, whereby one body slipped over the other and the disaster of a telescoping came to pass.

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The second medal is that of the Travelers Insurance Company. Its award is to the American employer who has achieved greatly in protecting the lives and limbs of workmen. In 1916, this goes to the Commonwealth Steel Company of St. Louis, for its work since 1912 in organizing safety movements among its employes, the installation of mechanical safety appliances, the educational and co-operative spirit realized, and the resultant reduction in the number of plant accidents.

The third medal is the Louis Livingston Seaman Medal, given this year for the mitigation of occupational disease. In alternate years it is awarded for the promotion of hygiene. In 1916, the award is to the Julius King Optical Company of New York, for its achievements in the application of science to work in the realm of the rays of light which are not visible in the common spectrum, but in which realm are the rays which are most active in causing cataract and other forms of blindness from work with steel and glass furnaces at very high temperatures.

The E. H. Harriman Memorial Medal, annually awarded to the American steam railroad most successful during the preceding year in protecting the lives and health of its employes and the public, is awarded to the Alabama Great Southern Railway Company. This award is especially interesting because the award for 1915 was made to the Cincinnati, New Orleans & Texas Pacific Railroad, a part of the Southern Railway System. In the opinion of the jury, this company's report showed a remarkable record. During the year not a passenger was killed; no employe was killed in a train accident, and but one fatality occurred in other than a train accident. With more than 2,000 industrial workers, none was killed and only two were injured. Such was the care in the operating conduct of the railroad, that the number of adverse points chargeable against its system was 39.79, as against 112.30 for the next road. Even the latter number of points represents a high achievement in the direction of safety, reached in large measure by reason of the competition.

The silver replica of the Harriman medal, awarded to that division of the American steam railroad which, during the year, has been the most successful in protecting the lives and health of its employes and the public, is awarded this year to the Illinois Division of the Illinois Central Railroad, which presented a splendid record of achievement. Several competitors were disqualified because of the fact that they had received the award of this medal on precious occasions. The rules debar such recipients from competition, for a period of three years.

The replica of the medal in bronze, designed for the individual considered most efficient in work for the promotion of safety and health, was awarded to Mr. James A. McCrea, general manager of the Long Island Railroad Company, who earned the honor through his safety publicity campaign for the education of those who use Long Island trains and crossings.

The Anthony N. Brady Memorial Medal, awarded to the American electric railway company, which for the year of the award has done the most to conserve the safety and health of the public and of its own employes, is awarded to the Connecticut Company, with headquarters at New Haven, Conn., of which L. S. Storrs is president. The work of this company impressed the jury as of great value in the safety movement, not only for the excellent record made as far as electricity is concerned, but also on account of the efforts

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made to enlist the co-operation of the public. The company operates its lines in more than a dozen cities, including Bridgeport, New Haven, Waterbury and Hartford, where operating conditions have been rendered more difficult on account of the influx of population along the lines as a result of the industrial expansion occasioned by the war. On recommendation of the president of the Connecticut Company, the silver replica of the medal is awarded to Mr. Seth W. Baldwin, assistant attorney, in recognition of his campaign to impress upon the public the need for the more careful use of the highways and more caution in the use of street cars, as well as for obtaining co-operation among all departments of the company. For similar reasons the bronze replica is awarded to Mr. W. J. Flickinger, secretary to the president. Honorable mention goes to the Pacific Electric Railways of Los Angeles, Cal., and the Interstate Public Service Company of Indianapolis, Ind.

Dr. Louis Livingston Seaman commented on the award of the 1916 Seaman Medal as follows:

"The award of the 1916 medal was very gratifying because I have been interested for a long time in the original work of the King Optical Company. It has made very conscientious and painstaking research into what seems to have been a new field and most of it seems to have been pioneer work, of a sort that could only be done by the exercise of much patience and skill. I am told that the experiments of many authorities were checked and compared, and wherever possible, actual conditions were studied. The eye is a marvelously delicate organism and modern industry puts it to ever increasing trials and strains, and any effort to conserve and protect its wonderful structure is praiseworthy. The efforts of the Julius King Optical Company have produced such excellent results that they merit recognition, and show a spirit of hopefulness for future progress on similar lines that is most commendable. The board of trustees of the American Museum of Safety is to be congratulated on the award of the medal for protective devices mitigating eye hazards of workmen."

Dr. A. D. Risteen, director of technical research, Travelers Insurance Company, outlined the contribution to the safety movement of the insurance companies interested in accident insurance.

Among those present at the presentations were Hon. Joseph H. Choate, Dr. Norman E. Ditman, Dr. Charles A. Doremus, L. B. Gawtry, Mrs. E. H. Harriman, Dr. Frederick L. Hoffman, A. A. Hopkins, Dr. George F. Kunz, W. J. Moran, F. E. Rogers, A. R. Shattuck, James Speyer, Arthur Williams, A. H. Young, L. S. Storrs, S. W. Baldwin, W. J. Flickinger, F. S. Wynn, B. Battisfore, J. A. McCrea, R. Dean, W. G. King, F. W. King, F. Morey, A. C. Munn, Mrs. H. H. Jenkins, Dr. A. D. Risteen, J. W. Lieb, H. W. Forster, M. A. Dow, C. W. Price, J. H. Patterson, Prof. F. R. Hutton, J. L. Thompson, H. H. Westinghouse, Gen. Du Pont, and F. W. Smith.

Comments by Arthur Williams, President of the American Museum of Safety

During the past nine years the American Museum of Safety has sought, through the award of medals, to give recognition to noteworthy effort toward accident reduction and prevention, and the presentation of these medals has come to be an annual event of considerable importance in the industrial world. The custom started in 1908 with the award of the *Scientific American* Medal for the most efficient safety device invented within a certain number of years and exhibited at the museum. Since then, the number of awards has been increased to the present five now covering practically every branch of industry, and there is a growing realization of the value of what these medals represent. They are, in my opinion, one of the strongest influences working today to encourage safeguarding of industrial life and health.

More than a little psychology stands back of such a system to recommend it. No one is above wanting appreciation—the employer needs as much encouragement in adopting safety and welfare

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methods as the employe needs to make him produce the best that is in him. By means of the recognition which is expressed in these medals, the general public is informed of work especially deserving of praise. Publicity is the surest method of encouraging good, and an equally sure method of discouraging evil and reactionary industrial conditions. Time and again an employer needs only to be shown the advantages to be gained through providing better working conditions to make him adopt them; time and again an employe who has been careless about some dangerous feature of his work can be made particular, when he realizes that he shares equally with his employer responsibility for maintaining a good general accident record.

Aside from the moral obligation, safety pays. Accidents to workmen and time off through illness are costly items to both sides of the labor balance. For the workmen, accidents bring in their train a long procession of evils; yet to be free of them strangely enough does not seem sufficient incentive for carefulness, and here medals in recognition of such effort have been able to supply the needed incentive in a great many cases.

In the case of the employer, public opinion may first induce him to put in safety devices, but he will soon discover that preaching carefulness to his men and encouraging it in every way possible is the best policy from every standpoint, both moral and economic. Accidents to the public, like those occurring on railroads, are apt to prove even more expensive to the operating company and to the community in which they happen than those strictly termed "industrial."

Since the beginning of the safety movement there has been a most encouraging reduction of accident percentages among the large industrial concerns which have figures available on this subject. Particularly in the last four years has the tide turned strongly toward safety, percentages of anywhere from 40 to 75 in the number of accidents reduced being the commonplace rather than the exception.

Such figures are an endorsement of what the American Museum of Safety has been doing in spreading the doctrine of accident prevention. It shows us in black and white what the movement we are trying to foster can accomplish. It shows us the ever-widening scope of welfare and safety propaganda.

However, this is but one side of the problem; there is still needed wider education of the employe and the general public, in their responsibility in this safety and welfare problem. Here again it seems to me the system of awarding medals for achievement is of great value. Each individual employe who is made to feel himself part of an organization striving to realize the highest ideals of safety, assumes unconsciously a new attitude toward his work. He becomes more careful personally and he takes a new interest in all departments of the business. Like the householder in a community, he first learns the advantages of keeping his own house and property in good order, and then realizes the necessity of a broader community spirit which sees to it that the entire neighborhood is equally well kept.

The general public, however, is perhaps more in need of education than either employers or employes, and, as Professor Hutton, vice-president of the American Museum of Safety, puts it, "the ceremonial of awarding medals may serve, like the sign at a busy grade-crossing of a railway, to ask the self-centered and indifferent to 'Stop, Look, Listen!' to what he might otherwise pass by, unnoticing."

If in any measure the American Museum of Safety can by its recognition of effort make employer, employe and the general public give their attention to these problems of industrial safety and welfare it has more than justified its being.

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A Successful Safety Bonus System

Editorial Note: A letter received from the Patent Scaffolding Company, New York, says: "With reference to the article in the March number of SAFETY ENGINEERING, *on page* 153, *entitled 'Giving Bonuses to Encourage Safety,' and pursuant to the request therein for additional information on that subject, we wish to call attention to the Safety Bonus System, which has been in operation among our employes for almost one year, and which has worked out to the advantage of all concerned. As far as we know, this system is the only one of its kind in use.*

"Our business consists in leasing safety scaffolding machines to building contractors for use in connection with the erection of masonry on steel or concrete skeleton buildings. The installation of our scaffolds is done by our expert riggers. Although these riggers are men of long experience with our scaffolding machines, our safety bonus system has been developed on the theory that even the most expert men sometimes become careless, due to their familiarity with their work. Our system is designed to prevent any lack of necessary precautions due to that fact, and to stimulate the men to prevent any dangerous conditions being created not only upon our scaffolds, but in surrounding conditions, during the construction of a building, which may react to the disadvantage of our scaffolds.

"Our inspection system is the fundamental, underlying principle of our Safety Bonus System. Through this system the work of each employe is checked up and reported on. Any lack of precaution in the rigging of our scaffolding machines is called to our attention, and the riggers responsible for faulty installations are warned against a recurrence of such conditions. Each offense against safety carries with it a certain number of demerits, which are indicated on our employes' bulletin board, the nature of the offense being stated in each instance.

"Perhaps some of your readers will be interested in our Safety Bonus System as being of service to them in establishing systems applicable to their own businesses."

BONUS NOTICE in regard to installation and shop rules for riggers under which all riggers employed by the Patent Scaffolding Company have worked since June 1, 1916. A merit rating schedule governed by the following conditions:

Foreman.—In all gangs of two or more men, one man will be appointed by the superintendent as foreman for that job, and such foreman will be held responsible for the manner in which the machines are rigged.

Rules.—Detailed rules are given for installing machines, and a copy must be carried by each rigger.

Inspection.—All jobs will be inspected daily by the scaffolding inspector. The results of inspections, with particular reference to unsafe conditions, will be communicated in writing to the superintendent, who will pass upon all complaints. the inspector also will be on merit basis, passed on by superintendent.

Demerits.—For each violation of the rules, demerits will be marked against the record of each man in the gang that installed the job complained of, with an additional 10 per cent of said demerits against the foreman.

Bulletin Board.—A bulletin board will be placed in the shop with each rigger's name shown thereon, opposite to which will be posted demerits due to violations of rules.

Bonus.—On the first of January, April, July and October, $5.00 in gold will be awarded to each rigger who has not received 25 or more demerits during the preceding quarter.

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Qualifications.—No rigger, until he has been employed as such by the company for the equivalent of one year, will be allowed to act as foreman or be qualified to receive a bonus.

RULES GOVERNING INSTALLATIONS AND SHOP WORK

DEMERITS

1. *Platform Machines.*—All platform machines must be put together properly and all nuts must be fully screwed thereon..... 15

2. *Outriggers.*—Must always be installed at right angles with the building where there are headers.... 10

Outriggers must be placed as near as possible in center of anchor..... 5

3. *Stop Bolt.*—Stop bolt in end of outrigger is most important and must always be provided. This is imperative, and under no consideration can it be omitted..... 25

4. *Anchors.*—Must be well tightened and should securely tie down the outrigger to the beam in the floor or roof..... 20

Sides of anchors must be placed as close as possible to outriggers..... 5

5. *Putlog.*—Rig machines so as to hang proper 4 inches distance from wall under construction..... 5

6. *Shackles.*—Should be placed directly over the center of drums..... 5

The inside shackle must not be more than 18 inches from bearing of building, without additional support from another beam..... 20

7. *Shackle Bolt.*—Eye in cable must be placed in center of bent bolt 5

8. *Guard Rail Support.*—Should always be put in place..... 10

9. *Overhead Machines.*—Overhead machines separator bolts must have full thread and be well tightened 50
(25 each in two quarters)

Pawls must be left constantly in mesh 20

10. *Shoes.*—Shoes that set at an angle must be always of 2″ turned-end type and ends placed directly against channels 10

11. *Common to Both Machines.*—Leave at least two turns of cable on all drums 10

12. *Shoring or Safety Cables.*—Must be provided in all cases where: (a) Machines are placed on 8-inch channels or under, except span is less than eight feet..... 25

(b) Machines are placed on 10-inch channels where bearing is more than 3 feet from column..... 25

(c) Machines are placed on 12-inch channels, or light I-beams, where span is 18 feet or over and when there are two machines thereon located more than 4 feet from column 25

13. *Advising Office.*—In cases where it is impossible to put on safety cable or shoring, rigger must immediately notify the office by 'phoning 25

14. *General Rigging Instruction.*—These rules do not cover all the dangerous scaffolding conditions around buildings, and riggers will be held accountable, unless the office has been notified by 'phone, for any work left in an unsafe condition, whether mentioned in these rules or not 25

15. *Duties of Inspector.*—See that all putlogs are directly under outrigger, thus giving a straight lead... 10

16. *Cables.*—The cables should always hang perfectly perpendicular from the shackle on the beam..... 5

17. *Planks.*—Should be laid so that the drum will not be pulled one way or another as the scaffold raises 5

18. *Guard Rail.*—Must always be erected either by means of a rope or cable pulled through the eye of the guard rail support, or by securely affixing substantial wooden bars.... 5

19. *Guard Plank.*—Should always be placed continuously along outer edge of platform to prevent material from sliding therefrom upon those below 5

20. *Overhead Protection.*—Overhead protection to guard workmen from falling objects, should be securely attached and properly sheathed 10

21. *Wire Netting.*—Should be stretched between guard plank and rod to prevent spawls and chips from flying off platform..... 5

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22. *Washing Down.*—Cables must be adequately protected by canvas or hose from the effects of acid splashing thereon 15

23. *Inspector.* — Must immediately remedy, if possible, any unsafe condition discovered, or else 'phone office regarding same 25

24. *Daily Written Report.*—Report on the condition of our equipment upon jobs, as found, must be filed daily at office by inspector..... 15

25. *Shop Rules.*—(a) Each rigger will be provided with a raincoat and hat with his name indicated thereon. If this "rainy day outfit" is lost, it will be replaced, but charged against the man 1

(b) Each man must have a monkey and an S-wrench and pliers and use his own tools exclusively..... 1

(c) Lockers must be kept neat and will be inspected weekly..... 1

(d) All equipment and material must be placed in locations designated 1

(e) All greases and oils must be kept off floor as much as possible.... 1

(f) All platform machines must be placed on skids and other equipment on trucks, or in its regular place (unless given orders to contrary)..... 1

General.—Careful compliance with the above shop rules will greatly increase efficiency in handling heavy equipment, and each rigger is expected to work for that result in all operations.

How to Reduce Accidents in Mines

By E. C. Lee

Assistant to the Director, Department of Inspection and Safety, Associated Companies, Pittsburgh

Editor's Note: This concludes Mr. Lee's article, the first part having appeared in the April number.

ANY educational effort, and particularly education along safety lines, must originate with the employer. Since caution is made up of example, counsel and discipline, the employer, and hence the officials, must set an example of safe thinking and doing, else the men cannot be expected to exercise care in their work; he must instruct the men in safe practices, pointing out the unsafe and the safe methods of doing their work; and, finally, he must make it understood about his mine that all safety rules are to be obeyed, and that any workman failing to follow such rules will be disciplined.

Although it is true that the experienced miner often meets with serious injury, this is due largely to the fact that he is granted more privileges than the average beginner, does all the most dangerous mining, and through the daily contact with danger has probably grown unresponsive to thoughts of personal safety. It is natural to expect that conditions favor the experienced and thoughtful miner, and it is an established fact that the careful worker is the most efficient.

The number of accidents to miners, motormen, drivers and trip-riders caused by undue carelessness emphasizes the necessity of pointing out the reckless and dangerous habits which are commonly contracted. Training and education are necessary for safety and efficiency, and, therefore, the safety movement commends itself for all classes and types of labor.

Many accidents happen on account of men not understanding thoroughly the work they are set to perform and the dangers which surround the work to be done. Especially should all new workmen receive instruction regarding the proper and safe manner in which to do their work, in a language which they understand. It is particularly important that they be warned of dangers not apparent except to the intelligent and experienced workman, and shown how such dangers may be avoided.

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Practical instructions at the working face, supplemented where possible by illustrated class room talks, should be given on how and where to set timber, necessary precautions in testing the roof or face, use of safety lamps and portable electric lamps, handling explosives, blocking cars in rooms, and traveling to and from work underground. Experience is a good teacher, but the element of danger is too prevalent to warrant the experienced miner in pursuing his own methods. The miner should have the knowledge that will enable him to work in comparative safety when left to his own devices. Such instruction is the means of making not only an efficient workman out of a new recruit, but a useful citizen as well, and is greatly promoted by an adequate inspection system which gives personal instruction whenever and wherever required.

No safety magazine nor any magazine for educating or training miners regarding safety can hope to succeed without the hearty co-operation of the mine workers in the undertaking. Not only must their interest be aroused, but their sympathy and aid must be secured. As a rule, the miners, especially the foreigners, are diffident and somewhat suspicious as to the purpose of the mine operators. The most successful way to break down this feeling, if it can be accomplished, is to secure their membership not only on miners' committees, but on committees placed in charge of the preparation of bulletin board material, as assistants in educational work, but particularly in connection with conducting first aid and safety training. Their active employment as members of committees or organizations in charge of such work and on an equal footing with other members who may be mine officials or company men, would do much to gain their continued interest by appealing to their self respect.

Safety education and training should, among other important features, have as its aim the creation of a spirit of enthusiasm in safety work and the establishment of discipline of a high order. It should aim to systematize rules and regulations and to back up rules by supervision and enforcement. It should aid in the preparation of bulletin board material and rules; systematizing of the posting of danger signs and sign boards; the adoption of and acquaintance with uniform signalling systems; the prompt reporting and remedying of unsafe conditions; the safeguarding of dangerous machinery; the investigation of accidents with a view to determining means to prevent a recurrence of similar accidents; and the holding of frequent public meetings in the interest of safety.

Inspections should be so conducted as to acquaint all workmen with the endeavors of the operator toward safety. The work is advertised and every man knows that special effort is being made to make conditions safer. Workmen serve on committees, and hence have a feeling of individual responsibility, and consider it an honor to belong to such committees. In many instances bulletins are printed periodically dealing entirely with safety matters so as to promote progress. Interest is further stimulated by the award of banners and prizes to divisions having the best record in accident prevention.

Although it appears that a high state of recklessness exists with industrial workers there is an inherent desire in every man to save life, whether it be his own or that of another. Owing to the hazardous nature of mining, there is a natural bond of fellowship among miners, which has often been evidenced by deeds of heroism without desire for reward. *When men risk their lives to save those of their fellowmen, will they not be equally willing to keep the mines safe?* This question can undoubtedly be answered in the affirmative when the men fully realize the important part each plays in accident prevention. Statistics show that in the coal mines of our country every working day 50 men are either killed or severely injured, and approximately 100 more receive injuries of a less serious nature. In the metal mines, 20 men are either killed or severely injured daily, and the number of those less seriously injured approximates the number in coal mining even though the total number employed is less than one-fourth of that employed in coal mining. Every miner should, when informed of

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such facts, give his hearty co-operation to a work which so vitally concerns him and those dependent on him.

In addition to the initial public meeting and the regular monthly meetings of the various safety committees, there should be frequent public meetings, "booster meetings," or rallies for safety, in which the problems of accidents, their causes and prevention, should be openly discussed. The programs of such meetings, many of which have been held during the past two years, contain many interesting features. Lectures are given and the desired lessons on how accidents can be avoided are taught by means of stereopticon views and motion pictures, with other forms of entertainment, and such meetings are finally resolved into the community life and rightfully form a part of it. The mind is forcibly impressed and "Safety First" becomes a common topic of conversation among the miners and their families. Whenever they meet this vital question is discussed and the graphic narrations of accidents and narrow escapes, failure to stand props, setting off the gas, drilling out misfires, etc., decrease in direct proportion as interest in and discussion of safety increase.

Every accident is a reminder that something is wrong, and that it may be non-fatal instead of fatal is really of no consequence so far as accident prevention is concerned as a whole. Almost any serious accident might easily have proved fatal.

Nothing has more potent influence toward increasing the safety in a mine operation than the training in first aid and in mine safety problems. The mere effect of a number of men meeting together for either of these purposes necessarily results in their discussing accidents and the nature of injuries, the cause of the accidents and the means of preventing them. Thus, such meetings are of value to all participating in them.

Interest in the routine of safety, in first aid or in mine safety problems cannot be maintained without the hearty co-operation of the mine management, nor without some incentive, such as the opportunity to compete in meets before public audiences and for prizes. First aid work offers the opportunity to the mine worker for a display of skill in competition with his fellow workmen as does a game of baseball or football to the unemployed youth. It is therefore essential that the mine management arrange contests, or co-operate with the men in securing their participation in contests between selected teams from his own company, in competition with those from other companies. Necessarily, there must be incurred some expense for the time of the men while attending a local contest, or for time and traveling expenses if attending a distant or interstate contest. It is the opinion of most experienced mine managers that the expense is well repaid in the interest and enthusiasm of the participants and their friends, and in the interest which is aroused throughout the operation in safety subjects.

"As a man thinketh, so is he."

Educate your employes to think safety.

Railroad Fire Prevention

"THE suppression of destructive fires cannot be accomplished unless every plausible theory is followed out, and some final conclusion reached, concerning the true origin of each and every little blaze that threatens to become the enemy of mankind. In other words, an accurate diagnosis is essential before the proper remedy can be applied. A study of this kind will be found interesting, although it involves work that appears fruitless in the initial stages." This is the thesis of an article by Robert Scott, of the Atlantic Coast Line, in the Quarterly Bulletin of the Railway Fire Protection Association. He also urges that the means by which they are extinguished should be noted in all reports so that an estimate of the most efficient means of checking fires may be established.

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Fire-Safety for the Nation

Resolutions Adopted by the National Fire Protection Association May 8, 1917

THE National Fire Protection Association, assembled in Washington for its twenty-first annual meeting, calls attention to the new and unusual hazards to life and property created throughout America by the world war which demand the utmost vigilance and initiative, not only from those in authority but from the private citizen as well. Every individual should consider himself a fire warden of the nation at this critical time and should equip himself to serve his country by safeguarding to the extent of his intelligence and ability every form of natural and created resource. The elimination of waste, at all times the duty of good citizenship, is at this moment our profoundest public and private responsibility.

In its warfare against the needless sacrifice of human lives and property by fire the association advocates the following measures:

1. The adoption by municipalities of the Standard Building Code of the National Board of Fire Underwriters to the end that fire-resistive building construction may be encouraged, the use of inflammable roof coverings prohibited, adequate exit facilities from buildings assured, and interiors so designed and fire-stopped as to make easy the extinguishment of fires therein.

2. The adoption by all States of minimum building requirements for the protection of State and county hospitals, asylums and similar institutions outside city limits and of small communities in which the establishment and enforcement of a building code is impracticable.

3. The enactment by each State of the fire marshal law advocated by the Fire Marshals' Association of North America to the end that official investigation may be made of the causes of all fires, preventable fires may be eliminated by public education, and the crime of arson stamped out.

4. The adoption of the association's suggested ordinance providing for the systematic inspection of all buildings by city fire marshals or local firemen to insure the vigorous enforcement of rules for cleanliness, good housekeeping, and the maintenance of safe and unobstructed exits, fire-fighting apparatus and other protective devices.

5. The enactment of ordinances similar to that of Cleveland, Ohio, fixing the cost of extinguishing preventable fires upon citizens disregarding fire prevention orders, and a more general legal recognition of the common law principle of personal liability for damage resulting from fires due to carelessness or neglect.

6. The wider general use of the automatic sprinkler as a fire extinguishing agent and life saver and the more general adoption of the fire division wall as an important life-saving, exit facility.

7. A careful study of the technical surveys of cities made by the engineers of the Committee on Fire Prevention of the National Board of Fire Underwriters covering the items of water supplies, their adequacy and reliability, fire department efficiency, fire alarm systems and conflagration hazards: and of the possibility of co-operation among neighboring cities through mutual aid and the standardization of hose couplings.

8. The adoption of the association's suggested laws and ordinances for State and municipal regulation of the transportation, storage and use of inflammable liquids and explosives.

9. The universal adoption and use of the safety match and legislation prohibiting smoking in all parts of factories, industrial and mercantile buildings except in such fireproof rooms as may be especially approved for the purpose by fire departments.

10. The education of children and the public generally in careful habits regarding the use of fire.

11. The co-ordination of all these activities, through a central administrative

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officer or body of the State or city having primary jurisdiction, for the purpose of promoting uniformity of action and efficient co-operation.

In the furtherance of these objects the association appeals for the co-operation of all citizens. It asks them to help in the dissemination of its valuable literature and in the use of the standards of fire protection so carefully worked out by its committees to the end that the lives and substance of our people shall not continue to be dissipated by a reckless and easily preventable waste.

Industrial Safety for Women

IN a letter to the chambers of commerce of 500 cities, Mrs. Carrie Chapman Catt, president of the National American Woman Suffrage Association and a member of the newly appointed Woman's Advisory Committee of the Council of National Defense, has asked for the co-operation of the trade bodies to secure reasonable working hours and equal pay for equal work for the women who take men's places in business offices, factories and other occupations. The letter urges that "the work performed, not the sex of the worker, should determine the pay," and states that "We recognize also the unfairness to men and the injury to industrial standards in general resulting from the competition of low-paid woman labor." It draws attention to the fact that women who take men's places in the war emergency have likewise to bear men's burdens in the support of their families.

The association is calling upon its State and local branches all over the country, with a membership of 2,000,000 women, to take up this form of national defense work in addition to the rest of their war service. A widespread propaganda will be conducted through every available agency to induce the women workers themselves, as well as employers, to maintain proper standards in the interests of public health and efficiency.

Clean-Up Week in Kansas

IN a proclamation setting apart the week of April 16 as Clean-Up Week in Kansas, Governor Arthur Capper said:

"During a normal year fire destroys more than $3,000,000 worth of Kansas property. When the cost of carrying the insurance business of the State and the expense of maintaining fire departments and other fire-fighting equipment is added to this sum the total cost to the State of Kansas is found to be nearly $10,000,000 per year. It is now recognized by all that by far the greater portion of this tremendous fire waste is altogether unnecessary. Much of the damage results from the accumulation of refuse, such as old clothes, rags, papers, rubbish and other waste materials in and about buildings of all kinds. Such accumulations are most common during the winter months, and with summer approaching, it is a good time to clean up and put all buildings and premises in a safe and sanitary condition. The same conditions that breed fire breed disease. House waste attracts flies, vermin and rats. Empty cans and bottles afford a breeding place for mosquitoes. Decaying stable manure and the unflyproofed outside toilet are favorite breeding places for the typhoid fly. Thus are the ways and means afforded for the transmission of disease and the creation of health and fire hazards. . . . . It is, therefore urged that every citizen of Kansas, whether he be a private citizen or a public official, devote whatever time is necessary to the work of cleaning up streets, alleys, back yards, yards about farmhouses and barns, basements and attics of all buildings, public or private, and removing therefrom every possible cause of fire."

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The Home Guard Against Fire

Underwriters' Standard Schedule for Grading Cities and Towns

ONE of the striking evidences of the progress of the movement to reduce the danger to life and property from fire is the recent adoption by the National Board of Fire Underwriters of a "Standard Schedule for Grading Cities and Towns of the United States With Reference to Their Fire Defenses and Physical Conditions."

The casual reader of the schedule, or one not fully acquainted with the problems involved, will fail to realize the extent of the task of preparing standards for all the features of fire protection and physical hazards, and of equitably balancing the relative importance of these various features and especially the weights to be assigned to such shortcomings as exist in varying degree in different communities. It was only by trial and retrial in a large number of cities and towns, presenting a wide range of conditions, that satisfactory results were arrived at, and this work has been practically continuous for the past two years.

The adoption of the schedule will affect, directly or indirectly, the interests of practically every property holder in the United States, and even those most familiar with it have only begun to realize the extent of the influence it will have on the development of improved fire protection and the elimination of the fire hazard.

Up to the present time underwriting boards and bureaus throughout the country have had various standards for grading the adequacy and reliability of these features. There has been a great lack of uniformity in these standards, arising partly from differences in fundamental principles and partly from gradual changes dictated by local considerations. Some jurisdictions have mainly excellent schedules, while others have none at all. One advantage of the National Board Grading Schedule, as devised, and as it works out in practice, is that it can be used in connection with any of the various types of rating systems.

As a preliminary to the preparation of the grading schedule, it was necessary to formulate standards covering the various pertinent features of fire-fighting facilities and structural conditions and hazards; and for this task the work of the engineers of the National Board since 1904 in examining and reporting on conditions throughout the United States, has peculiarly fitted them. Many of these standards had been formulated before beginning work on the schedule, which was outlined in its present form about three years ago.

The grading schedule is based upon the plan of assigning to the various features of fire defense, points of deficiency depending upon the extent of variance from the standards formulated from a study of conditions in more than 500 cities; the natural and structural conditions which increase the general hazard of cities and the lack of laws or of their enforcement for the control of satisfactory conditions, are graded in the same way. The sum of the maximum points of deficiency totals 5,000 and is divided in accordance with the relative values of the features considered as given below.

RELATIVE VALUES

	Points
Water Supply—	
Engine Stream Basis	1,700
Hose Stream Basis	1,200
Fire Department—	
Engine Stream Basis	1,500
Hose Stream Basis	1,200
Fire Alarm	550
Police	50
Building Laws	200
Hazards	300
Structural Conditions	700
Total	5,000

It is recognized that climatic conditions affect the fire losses by reason of the frequency of fires due to the heating hazard, by retarding the response of fire apparatus, by hampering effective fire fighting during cold weather and storms, by the

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increase in combustibility due to hot and dry weather, and by the greater probability of fires spreading at times to high winds. These elements are to a greater or less degree common to the whole country, and therefore no deficiency is considered in the schedule for normal climatic conditions. Some sections of the country, however, are subject to abnormal climatic conditions, and to cities in these sections a super-deficiency is applied.

The schedule is written in such a way as to emphasize standard conditions, points of deficiency being determined throughout for failure to meet the requirements necessary for standard adequacy and reliability. Such an arrangement offers an excellent opportunity for a city, through its engineers or consulting experts, to improve conditions along the proper lines and to secure the benefits resulting therefrom. Water supply is divided into a total of 32 items, ranging from the method of appointment of the employes to the condition and type of hydrant used; fire department organization, equipment, and operation is considered under 34 items; fire alarm service has a total of 24 items under which deficiencies are applied, including the fire service performed by the telephone company; police co-operation is graded in 4 items; building laws in 4, of which one has 14 sub-divisions; hazards, including electricity and other lighting, as well as explosives and inflammables, has 9 main divisions and the effect of structural conditions on the conflagration hazard of the principal high value district is considered under 17 separate heads, of which 3 act as credits, offsetting deficiencies in the others.

In order to properly balance the charges against the various items, it was necessary to make trial applications to a considerable number of cities, and by comparison and study of the results to so modify the schedule as to produce consistent results.

To date, more than 200 municipalities have been classified, including all cities on which reports were being issued by the Committee on Fire Prevention. These municipalities included towns of various sizes and in different parts of the country, and covered a great variety of conditions; it is interesting to note that in practically all cases the results appear to be logical and properly proportioned to the actual protection afforded. Some minor changes have been found necessary, mainly in respect to the application of the schedule to smaller communities.

A revised issue of the schedule was approved by the Actuarial Bureau Committee of the National Board on December 5, 1916, and on recommendations from that committee, it was adopted by the Executive Committee on December 14, 1916, as a National Board standard.

A resolution adopted by the Executive Committee in June, 1915, and reaffirmed in December, 1916, is to the effect "That it is the sense of the committee that the application of the schedule to cities having a population of 20,000 or over shall be made by engineers of the National Board of Fire Underwriters."

The schedule has already been adopted by the South-Eastern Underwriters' Association, after trial applications to a large number of cities and towns in that territory. Other organizations are giving careful study to the schedule, and the outlook is favorable for its more extended adoption. A committee of the New England Water Works Association, appointed to consider the subject, reported to the annual convention of the association in September last; this report, without attempting to discuss the details of the schedule, was, on the whole, very favorable to the general plan, as was also the discussion by various members of the association.

It is the intention of the National Board, as expressed in the resolution of the executive committee, to provide for the application of the schedule to cities having a population of 20,000 or over.

A special committee, appointed to consider ways and means for the application of the schedule, reported to the Executive Committee on March 1, recommending for this purpose an increase in the appropriation for the Committee on Fire Prevention for the coming fiscal year sufficient to meet the estimated requirements; the recommendation was approved by the Executive Committee, and the increase will be included in the

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budget of the Committee on Fire Prevention.

The new Standard Grading Schedule is so thoroughly based upon principles recognized as sound and correct by underwriters and engineers that it will doubtless come into general use throughout the entire country, its application directed by the engineers of the National Board of Fire Underwriters.

Causes of Death by Occupation

BASED upon 94,269 deaths of male and 102,467 deaths of female industrial policyholders, 15 years of age and over, as recorded in 1911, 1912, and 1913, by the Metropolitan Life Insurance Company, tuberculosis caused the death of 20.5 per cent of the former and 14.4 per cent of the latter, while organic diseases of the heart were responsible for 12 per cent of the deaths of males and 14.8 per cent of the deaths of females. The average age of men dying from tuberculosis was 37.1 years and of women, 34.1 years. Of males the lowest average age at death, 31.1 years, was among those who died from typhoid fever, and of females the lowest average age at death, 29 years, was among those who died in childbirth. By occupation, the lowest average age at death was 36.5 years among bookkeepers and office assistants and the highest average age was 58.5 years among farmers and farm laborers.

These facts are brought out in tabular form in Bulletin 207 entitled "Causes of Death by Occupation," a study made by Louis I. Dublin and recently issued by the Bureau of Labor Statistics of the United States Department of Labor.

Tuberculosis was responsible for the largest number of deaths among clerks, bookkeepers and office assistants (35 per cent); compositors and printers (34.1 per cent); gas fitters and steam fitters (31.6 per cent); longshoremen and stevedores (29.2 per cent); teamsters, drivers and chauffeurs (28.2 per cent); saloonkeepers and bartenders (26 per cent); machinists (25 per cent); cigar makers and tobacco workers (24.1 per cent); textile mill workers (22 per cent); iron molders (21.9 per cent); painters, paperhangers and varnishers (21.9 per cent); masons and bricklayers (19 per cent); bakers (18.8 per cent); laborers (16.4 per cent); blacksmiths (14 per cent). Accidental violence was responsible for the largest number of deaths among railway enginemen and trainmen (42.3 per cent); railway track and yard workers (20.8 per cent); and coal miners (20.4 per cent); while the largest number of farmers and farm laborers (16.4 per cent) died from organic diseases of the heart, due to the facts that the prevalence of these diseases increases with age and that the average age at death of those in this group is higher than any other group.

Similarly, among women the largest number of housewives and housekeepers (15.2 per cent) died from organic diseases of the heart for the same reasons stated above, while tuberculosis took the largest proportion of clerks, bookkeepers and office assistants (42.4 per cent); clerks and saleswomen (38.7 per cent); textile mill workers (35.5 per cent); dressmakers and garment workers, 27.8 per cent); and domestic servants (15.9 per cent). The average age at death was 26.1 years among clerks, bookkeepers and office assistants, and 53.3 years among housewives and housekeepers.

The statistics given in the bulletin indicate that respiratory diseases are prominent where the industrial worker is exposed to colds, drafts, and dampness (as among masons and bricklayers) or to violent changes of temperature (as among teamsters, drivers and chauffeurs). Organic diseases of the heart have a high proportional frequency in cases where the work is heavy and the cardiac powers are overtaxed (e. g., among iron molders). Suicide is frequent where depressing influences are present (as among bakers and cigar makers). Typhoid fever is high where questionable water supplies are used (as among enginemen and trainmen, farmers, iron molders, and laborers).

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EDITORIAL

"Chance-taking" Employers and Emloyes

IN this number SAFETY ENGINEERING introduces a new feature which may be termed Safety Conversations. The first conversation is a discussion of the question whether the carelessness of employes is responsible for more accidents than lack of concern on the part of employers. The participants in the conversation are Walter Greenwood, Safety Engineer, Carnegie Steel Company; Victor T. Noonan, State Director of Safety, Industrial Commission of Ohio, and Roger W. Straus, Secretary of the Labor, Safety and Welfare Department of the American Smelting & Refining Company.

We think our readers will find the opinions of the gentlemen very interesting. They are practically in accord in holding to a "strict accountability" "chance-taking" employers as well as "chance-taking" employes.

Mr. Greenwood is convinced that there are "no just grounds for placing so high the estimate of the carelessness of employes." He divides "chance-taking" employers into several classes—the inconsiderate, the apathetic, the ignorant, the greedy and the desperate. Mr. Noonan, who has been officially brought into contact with at least 20,000 manufacturing plants, says: "The plants that are actually succeeding in reducing accidents are the plants where employers have assumed personal responsibility for every accident occurring, who themselves have set the example to their employes of personal carefulness and of personal interest in safety and welfare." Mr. Straus believes that an accident "is often charged to the carelessness of the employe, when, in reality, it is largely up to the employer or his agents"; and, he adds, in plants "where no systematic work nor intelligent thought is given to accident prevention every accident is chargeable to the employer's account."

The "chance-taking" employe is by no means non-existent, but the "chance-taking" employer is perhaps far too common. Unless the head of the establishment is seriously impressed with the value of systematic, consistent and persistent safety work, the men he employs are quite excusable for being lax in their attitude toward accident prevention.

National Fire Protection Association

THE National Fire Protection Association held its twenty-first annual meeting at the New Willard Hotel, Washington, D. C., May 8, 9 and 10. Secretary Redfield made a stirring address to the delegates urging the same intensive methods in fighting fire that are now being applied for war purposes. The convention was a very successful one in point of attendance and in the importance of the business transacted. One day was spent at the Bureau of Standards where the laboratories and testing departments were thrown open for inspection.

The report of H. W. Forster, chairman of the Committee on Safety to Life, precipitated a lively discussion. Several members indulged in a spirited debate regarding the best methods for emptying quickly the upper floors of a burning building of its human occupants. Chairman Forster stated that to formulate rules governing quick exits from industrial and mercantile buildings that are on fire is almost a superhuman task as there are a great number of factors that enter into the problem.

A full report of this important convention will appear in the June number of SAFETY ENGINEERING.

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Safety News and Comment

Editorial Note: Safety Engineering invites its readers in all lines of industry to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.

Anaconda Copper Mining Company, Butte, Montana.

Hours, Fatigue and Health

HOURS, Fatigue and Health in British Munition Factories is the title of Bulletin 221, by the Bureau of Labor Statistics of the United States Department of Labor, as the first of a series of bulletins prepared at the instance of the Council of National Defense for the purpose of giving wide circulation to the experiences of Great Britain, France, Canada, and other countries in dealing with labor in the production of the largest quantity of munitions in the shortest space of time. The bulletin contains the reprint of 8 memoranda published by the British Health of Munition Workers' Committee, which was appointed in September, 1915, "to consider and advise in questions of industrial fatigue, hours of labor, and other matters affecting the personal health and physical efficiency of workers in munition factories and workshops." These memoranda deal with Sunday labor, hours of work, output in relation to hours of work, industrial fatigue and its causes, sickness and injury, special industrial diseases, ventilation and lighting in munition factories and workshops, the effects of industrial conditions upon eyesight.

From a perusal of these memoranda it appears that Sunday labor, in the opinion of the committee, is not profitable and that continuous work "is a profound mistake" and does not lead to increased output; that a system of shifts, although impracticable in some cases, is to be preferred to overtime, since the latter taxes the strength of workers too severely, results in loss of time because of exhaustion and sickness, and curtails unduly the period of rest; that night work should be discouraged, that output cannot be maintained at the highest level for any considerable period if the conditions are such as to lead to excessive fatigue and to deterioration in the health of the worker, with a recommendation that hours should not exceed 56 per week for men engaged in very heavy labor, or 60 for men engaged in mod-

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erately heavy labor, while 64 should be a maximum.

The committee's study of industrial fatigue and its causes sums up its own studies of hours of labor, emphasizing the importance of regularity of hours and of daily and weekly rests made with due consideration of the character of the work performed. In its report on sickness and injury the committee points out certain injurious conditions which should be guarded against as likely to diminish seriously the efficiency of the labor force. "To conserve energy and efficiency is, other things being equal, the way to improve output." The medical examination of all workers before employment is recommended, and it is suggested that factories should provide proper sanitary facilities, safeguard machinery, make arrangements for adequate medical and nurse schemes, etc. The value of first aid is emphasized.

The report on special industrial diseases gives the causes, methods of prevention, and treatment for the principal industrial diseases which have been found to affect munition workers. Particular attention is directed to the importance of adequate lighting and ventilation, which are absolutely essential for the maintenance of health and comfort, and therefore the efficiency and capacity of the workers. Special measures to prevent undue strain upon eyesight and to reduce the liability of accidents to a minimum are recommended.

The committee calls attention to the added danger of industrial accidents: "Moreover at the present time, the introduction of new labor, and of employes unaccustomed to the processes concerned, particularly in conjunction with the need for speed and pressure, overtime, and night work with the consequent fatigue, must inevitably lead to greater risk of accident. The war has caused indirectly an enormous increase in the number, severity and cost of industrial accidents, especially during the year 1916.

"The principal reasons for the large increase of industrial accidents are as follows: (1) Employment of incompetent, unskilled and inefficient labor. (2) Increased pressure for larger output. (3) Disregard and non-enforcement of safety rules and regulations.

"During the past few months the accident rate has been somewhat reduced, because employes have become more accustomed to their work. However, many of our industrial workers will now enlist to fight for our country, and the services of many skilled workmen will be placed at the disposal of the War Department. To fill their places, new employes will have to be hired, who are unfamiliar with their jobs. In fact, women will probably fill the places of many of the men who are called for service. With these changed conditions there will be even greater necessity for safety measures to prevent accidents."

Laboratories New York Office

ON May 1, 1917, the New York office and testing station of the Underwriters' Laboratories was moved from 135 William Street and 92 Vandam Street to the twelfth floor, 25 City Hall Place, where increased space and the location of offices and laboratories in the same building will afford improved facilities for the conduct of the work.

Book for Social Workers

THE Russell Sage Foundation announces the publication of "Social Diagnosis," by Mary E. Richmond. It is "a book on social evidence for all who make decisions affecting the welfare of individuals." It is especially intended for social workers, though teachers, judges, employment managers, physicians—all who must make decisions about persons—will find it useful.

The book is divided into three parts: (1) Social Evidence; (2) The Processes Leading to Diagnosis; (3) Variations in the Processes. Each part is subdivided into chapters, which are summarized in the table of contents.

The theoretical discussions are tem-

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pered—briefly and in such a manner as not to hamper the argument—by presenting more than 400 case illustrations and citations from the experience of practical workers, such as medical-social workers in hospitals, probation officers in courts, home and school visitors or visiting teachers, field agents of institutions for defectives, child-placing agents and overseers of public relief.

The work includes a series of "Type Questionnaires" on such disabilities as: Desertion, widowhood, recent immigration, neglected childhood, inebriety, insanity, etc.

Fire-Proof Safes, So Called

AN important lesson by the recent great fire at Asbury Park is the necessity for careful investigation into the heat-resisting qualities of safes and other receptacles used for safeguarding valuables. Of 13 safes found among the ruins of the Asbury Park fire, reports from 10 of them which were opened, showed in every case, that the contents were either destroyed or seriously scorched. In most instances the records were burned to ashes or tinder and the interior cabinet work was charred or burned away.

It has been pointed out by an expert that resistance to fire is not at all synonymous with resistance to heat. This fact is not always understood by many who are otherwise well informed in the principles of fire protective construction. "It has always seemed plain," he continues, "that fire resistivity was all that could be expected of a material entering into the construction of a building or any heat-proof device. Steel and concrete are combustion-proof but they are not heat-proof. All materials, even the so-called non-conductors, transmit heat, but at greatly differing rates. Steel, having a melting temperature of 2,600 degrees F., will easily resist an ordinary fire of about 800 degrees F. The only harmful effect will be distortion following expansion. A brick wall will also show little effect, but in time the heat on the fire side goes through to the opposite side and will ignite wood or other combustible material that may be in contact with it." Therefore, the greater the heat conductivity of the material used in construction, the sooner the dangerous temperature of ignition is reached. Resistance to heat is an essential quality in the construction of safes. The inadequacy of the ordinary iron or steel safe lined or insulated with cement or concrete is demonstrated in so severe a test as the Asbury Park conflagration. Generally speaking, the owner of such a safe has no proof of its ability to do the work expected of it until after the fire has taken place. The walls of the average safe are from 5 to 9 inches thick, but heat can penetrate walls of any thickness, provided it is intense enough, and if the material in the walls is of a character to furnish a conducting medium. The weight and bulk of a safe are no indication of the degree of protection it may afford. In the degree of heat produced and in duration, the Asbury Park fire furnished what in effect was a "furnace test" and it is agreed by experts that, owing to the rare occurrence of such fires, that a "furnace test" is the only reliable test for the efficiency of a safe.

Dependents of Enlisted Men

S. H. WOLFE, consulting actuary, New York, has been appointed special agent of the United States Department of Labor to report on methods for compensating the dependents of enlisted men in the military and naval forces of the United States. Mr. Wolfe was consulted by the government, and has offered his services without compensation. He has spent some time in Canada investigating the plans and experience of the Canadian government.

Common Accident Causes

LUTHER D. BURLINGAME, industrial superintendent of the Brown & Sharpe Manufacturing Company, told the Industrial Safety Congress at Syracuse that an investigation of 8,000 accidents occurring in their plant showed that the majority of accidents were caused by men falling from high places, things falling on men, men dropping heavy parts, and accidents due to hand tools.

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Poems of Safety

JOHN W. KAMPER, safety inspector of the American Locomotive Company, Schenectady, New York, under the title "Do It Now":

Turn in your mushroomed tools.
The burr
May reach your eye,
On the bound—
Tomorrow.

Report all broken horses
And scaffold planks.
You may hit the floor
With a considerable bump
With your body—
Soon.

Have all injuries dressed
At the shop hospital,
Even if it is a scratch.
Chances are
It will get infected—
Next week.

Study the safety bulletins
And heed them.
It will be an investment,
Which will earn dividends
For you—
Always.
Wear goggles.
Glass eyes
Are cheap,
But who wants 'em!!!

Throw away your working gloves,
Or cut the fingers out of them.
There is a considerable pull—
To a set of gears.

AND WHILE YOU ARE AT IT:
Line up Mike Awadoicare
For "Safety First,"
And Jim Takachance
And Dave Ishkabibble.
They are
As great menace
To you
As they are—
To themselves.
DO IT NOW.

A. Lipschutz, Philadelphia, under the title "Keep Away!":

Keep away from all live apparatus
If you value your life very much,
For the limbs you receive a-la-gratis
Were not meant to be steered by a crutch.
Be you very familiar or stranger,
And you care not to flirt with a nurse,
Keep away from all signs painted danger,
And you'll never have need for a hearse.

Be you helper or wise electrician,
And for years you have handled the pliers,
You will surely be sent to perdition
If you carelessly touch any wires.
Never think of your sweetheart or garden
While you're mending some cable that's hot,
For that cable will not beg your pardon
When you lie bandaged up on a cot.

Never touch a machine while it's running,
Better wait 'till it moves somewhat calmer.
If you don't like a black suit that's stunning
And don't care to employ an embalmer.
If you're joining two pieces of metal,
And its hot while you're pouring the solder
Keep your mind on your work, and the kettle,
Or you'll go to a place where it's hotter.

Keep away! Keep away! I keep saying,
From flashes and sparks tainted blue.
I would rather see you do the praying,
Than see people praying for you.
Keep away! Keep away! I remind you,
Not merely alone for your life,
But the folks that you will leave behind you—
Your home and your kids and your wife.

Killed Per 1,000 Employed

AN interesting comparison, as to the hazard in railroad work compared with other industries, is found in a statement published by the Prudential Insurance Company of America of the number of male persons killed per 1,000 employed, as follows:

	Killed.
Metal Mining	4.20
Coal Mining	3.50
Fisheries	3.00
Navigation	3.00
Railroad Employes	2.40

Mr. Hutson's Useful Manual

A VALUABLE book for merchants, manufacturers and underwriters, succinctly written and published in convenient pocket form, is "Fire Prevention and Protection," by A. C. Hutson, C. E., fire protection engineer, of which a third edition, completely revised, has recently been published by the *Spectator* Company. The plan of the work includes the presentation of references to various materials and devices which have been found useful in preventing or extinguishing fires, accompanied by such information as will enable property owners to be guided in the use of approved appliances and materials. It covers all suggested regulations of the

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National Board of Fire Underwriters and its allied organizations. Interesting miscellaneous information, tables and formulas add to the value of the work.

Manufacturer Should Go to Jail

AN emery wheel in one large concern flew apart in a shop recently. No one was injured, by good fortune. An examination showed that the manufacturer had filled a defect near the center with a lead filling which threw the machine off balance. In the same shipment two other wheels were found to be in a similar dangerous condition. The filling was covered by a paper label. The corporation is now inspecting all emery wheels before they are put into service.

Mine Accidents Decrease

FATAL accidents in the mines of Pennsylvania during the first quarter of 1917 decreased 25 per cent from the corresponding period of 1916. Fatal accidents in the first 3 months of last year numbered 334. This year there were 255. The decrease in the anthracite mines was 28 per cent, in the bituminous mines, 18 per cent. "Safety First" methods are given the credit for the improvement Mining operations have been unusually active this year, and such activity is not conducive to safety. The mine workers in Pennsylvania total 334,987.

Safety Standards for Ladders

THE spring meeting of the American Society of Mechanical Engineers is scheduled to meet in Cincinnati on May 21 and to continue in session for three days thereafter. All phases of munitions manufacture will be considered at regular and special sessions. "Test of a Motor Fire Engine" is the subject of a paper by Horace Judd. At the industrial safety session a proposed code of safety standards for industrial ladders will be acted upon.

Hazard of Train Suction

AN unusual accident to passengers on a Pennsylvania Railroad express train was reported recently by the Jeanette correspondent of the Philadelphia *Record*. "As the train was passing through the depot yard the suction of air drew several empty bread baskets from a wagon which was standing beside the track, hurling them against the windows of two coaches and shattering the glass. Slivers of glass were thrown in every direction, cutting several passengers."

Hot Ashes and Wooden Barrels

THREE residents of Spokane were brought before the courts charged with dumping hot ashes either near a frame building or in a wooden receptacle. In each case the judge imposed a fine of $25 and costs, and pledged himself to continue the policy for all future offenders. Sensible statutes backed by impartial enforcement of penalties will go far to discourage the dangerous combination of hot ashes and the wooden trash barrel.

Safety Curb at Bad Turn

THE principal boulevard entering Huntington Beach, Cal., passes under a railroad, with a bad turn at one end of the underpass. A double-faced curb has been constructed at this point to prevent collisions between vehicles by keeping them on the right side of the road. The curb is 6 inches wide on top, 12 inches high in the center of the roadway and extends for about 150 feet on each side of the subway or underpass. At each end of this curb is a large electric sign with the warning, "Keep to the Right."

Saved by Coast Guard

THE Coast Guard saved 1,216 lives during the fiscal year of 1916. Other assistance was rendered to 15,742 persons. The property saved from immediate jeopardy was more than $10,000 or twice the cost of the service.

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The Hysterical Public

THE Los Angeles *Graphic* points out that 2,000 more persons are killed every year by trespassing on railroads than lost their lives in the Iroquois theater fire, the *Titanic* disaster, and the sinking of the *Lusitania* combined. Asbestos curtains have been required for theaters, lifeboats for all passengers are required on liners, and revenge on Germany is generally demanded, but only in a few cases has any effective anti-trespassing legislation been enacted. "The same public which shows its teeth and acts with deadly precision when 500 are killed at one time, says nothing and does nothing when 5,000 are lost one by one. Railways are very safe to ride upon, but railways are very unsafe to walk upon."

Mine Fire Gases

A. S. RICHARDSON, editor of the *Anode*, the publication of the Anaconda Copper Mining Company, tells of a fatal accident caused by mine fire gases due to the fact that men entered workings into which they had been warned not to go. Investigation showed that both the man who was killed and his companion had smelled the gas for some time before feeling any ill effects, but had made no attempt to escape because a test had shown that a candle would burn brightly and they believed themselves safe.

The most common gases resulting from mine fires are blackdamp or carbon dioxide, and whitedamp or sweetdamp, or carbon monoxide.

Blackdamp, which is formed as the result of a process which removes the life-supporting oxygen from the air and, even when present in such small quantities that human life is not endangered, it will extinguish an oxygen-burning candle. It is colorless, odorless and heavier than air so that it settles to the bottom of mine workings when the air is undisturbed.

Whitedamp, or sweetdamp, is formed when materials such as wood or coal, are burned under conditions where only a limited or insufficient quantity of air reaches the fire so that complete combustion does not take place. It will burn when sufficient oxygen is supplied and will not extinguish a candle. Its danger to human life lies in the fact that when present in the air, even in small amounts, it is an active poison. When pure, or not mixed with other gases, it is colorless and odorless. It is lighter than air and therefore accumulates along the roof of a drift if the air is undisturbed. Its presence is best detected by taking birds, mice, dogs or other small animals into mine workings where its presence may be suspected, as these creatures are affected even when the quantity of gas is much too small to endanger human life.

Fire and Accident Prevention

FIRE and Accident Prevention Day is October 9, 1917. General Manager Cameron reminds the members of the National Safety Council, "Fire and accident waste is a great evil. The destruction of property is second only to waste of human life. Last year several of our local councils devoted an entire week to preaching the gospel of fire and accident prevention. Preparations for the celebration this year are already under way. You have an idea on this subject which would be of great value to the council, and, that we may have the full benefit of your suggestion, please get it in early. The council desires to classify all such ideas and make the work this year more effective. Help us get a prompt start by writing fully on this important subject. Do it now."

Safety First Suit

A GREAT proportion of the factory and workshop accidents are due to the clothing of workmen being caught in the machinery and the unfortunate person is dragged into wheels because it is impossible to break away from the iron grasp. A safety suit for a workman which will enable him to pull himself free in case of such an accident has been recently devised by H. P. Andrews, of Portland,

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Oregon. Instead of being sewed together at the seams, this new suit is held together by means of snap hooks. These answer all the demands for ordinary wear, but in case any portion of the workman's clothing is caught in the machinery the ordinary pressure which would be exerted in endeavoring to make his escape will enable him to pull that particular part of the garment free from the others, thus allowing him to escape possible death or probable injury.

Individual Safety Bulletins

THE Eastman Kodak Company is using an individual bulletin service which promises excellent results. A small holder is provided for each work place or machine and a card about 2¼ x 3¼ inches containing the safety lesson of the day is placed in the holder before starting time each day.

The bulletin cards vary in color, and number a score or more—each presenting a complete thought along safety lines. Shop hazards are clearly dealt with, and street accidents, home suggestions and special bulletins are presented in graphic form.

"Go Carefully Around Corners," says one of these miniature bulletins; "Live Switches—Pull them Both if you are in Doubt," "Track Walking," "Waste," "Skylarking," and many other titles suggest the splendid possibilities of the scheme. The cards are changed every day. The sample cards show a month's supply, each card shifting ahead one place every day. The cost is insignificant compared to the value of the idea. The lesson is valuable and obvious in its presentation, while the plan insures an intimate relation between employer and employe.

Careless Brakeman's Fate

ONE of the most frequent accidents to which reference is made in reports of railway safety organizations is the injury of a brakeman knocked off the side of a car by a baggage truck, or other obstruction carelessly left too near the track. This is one source of injury for which there is no explanation except carelessness, and no excuse whatever.

Safety Chains in Buffalo

AN industrial plant in Buffalo whose shipping has been greatly increased of late has placed chains on posts on either side of the cross walks in the shipping yard. When there is danger to workers in a certain part of the yard these chains are stretched across the walk by the watchmen or yardmen, thus compelling them to take notice of the unusual activity.

Illinois Steel Bulletins

THE Illinois Steel Company gets out an attractive monthly bulletin filled with pictures and trenchant paragraphs. One recent number has a page headed, "Every accident is an indication that something was wrong, either with men, methods, or material." Then it tells of accidents which have happened in the plant and points out where the fault lay.

Putting Out Electric Fires

ONE large western industrial plant warns against trying to extinguish fires in a motor with water. Their warning pictures a man unconscious from shock with a water pail near him. A second illustration shows the proper practice with a powder which will do the work and injure neither the man nor the motor.

"Short Cuts" Across R. R. Tracks

AS a part of a campaign to teach children the dangers of taking "short cuts" over railroads, playing on the right of way, etc., the Pennsylvania Railroad system has issued an illustrated calendar for use in school rooms in the territory served by the railroad. A picture at the top of the calendar shows a typical crowd of children hurrying across the tracks near the school yard to avoid going around on a bridge nearby. Beneath the picture is

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the legend, "Every year more than 5,000 boys, girls, and grown folks who take such risks as these throw their lives away. *Don't you be one of them.*" The children are asked to make these resolutions and act on them: "I will do my part to end the dark record of railroad trespassing in this country;" "I will avoid the danger of using railroad tracks for highways and short cuts;" "I will stop, look and listen at railroad crossings;" "I will endeavor to persuade others from recklessly inviting danger."

New System for Recording Accidents

BY order of Chief of Police Long of Newark, N. J., a new system of recording all accidents has gone into effect at headquarters in that city. Instead of the old casualty book, in which all cases were set down indiscriminately, the new system will involve the indexing of each accident in a separate section of a loose-leaf book. There will be a division for accidents that occur through horse-drawn vehicles, another for pleasure automobiles, and others for business automobiles, trolleys, railroads, fires, gas or explosion, crime and miscellaneous. Each division will be indexed, with a general index for the entire book. The new system is expected to greatly facilitate the ready finding of information as to accidents.

Niagara Falls Local Safety Council

THAT employes of Niagara Falls industries are taking a strong interest in the campaign of education now being waged in their behalf by the local council of the National Safety Council has been evidenced in many ways. They are discussing the subject of safety welfare among themselves. They are asking questions concerning the program of the local council and they are eagerly reading the lessons on safety welfare published weekly in a local newspaper. While this advertising campaign is being presented, however, the Niagara Falls Safety Council is working not alone upon appeals to the caution of the workers. It is bringing the employers of labor to a fuller sense of the need and value of reducing to a minimum the danger spots in their plants. Round table meetings of the council are being held at frequent intervals. Speakers, many of them safety men in the employ of the city's great industrial plants, describe how their concerns are maintaining interest in safety. The addresses are followed by general discussions and plenty of opportunity is given for anyone present to ask questions. The officers of the local council invite all who are interested to attend these meetings and join in the discussions.

Safety in Pacific States

HUGH S. HANNA is the author of a bulletin published by the United States Department of Labor; on "Labor Laws and Their Administration in the Pacific States." He says: "Since the object of all safety work is the prevention of accidents the only true measure of its success is the degree in which the number of accidents is reduced. In none of the Pacific States is there any satisfactory information upon this point. By each of them it is believed that safety efforts have resulted in a marked decrease in accident hazards. But for no State as a whole and for no large industry (except coal mining in Washington) has there been any important attempt to compile the material necessary to determine this fact. This condition is, of course, in no way peculiar to the Pacific States, the whole subject of accident rates having been little developed in the United States.

"To determine true accident experience from year to year it is necessary to know the accident rate for each year. And for the computation of an accident rate there is necessary not only the number of accidents but also the accident exposure—i. e., the number of persons employed and the period of their employment. Mere accident numbers mean little or nothing. A decrease in the number of accidents from 10,000 one year to 8,000 the following year does not necessarily imply that conditions have im-

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proved, inasmuch as the number of persons employed may have decreased in even greater proportion. In other words, it is quite possible that a decrease in the number of accidents may coincide with an increase in accident rates. It is evident, therefore, that without accident rates of some kind as a basis of measurement it is impossible to tell whether safety efforts have met with success."

Board with Nails Points Up

IT is not uncommon to see boards with nails, points up, ready for business—is it? Many a poor fellow (says the Paper and Pulp section of the National Safety Council) is hobbling around on one leg or otherwise crippled because he "didn't see the nail." Don't get your conscience into hot water by leaving around any such dangerous stuff. If you see something that some one else has left, pick it up. Safety means best in many things to many people. Help it to mean perfection by "Safety First," last and always.

Fireproof Floor Filling

THE proposed rule relative to the top filling in fireproof floor construction, for which a public hearing was announced by the Bureau of Standards, New York, for May 17, is intended to meet an alleged trouble in apartment house construction. It is contended that wherever wood sleepers are embedded in concrete or cement they decay after a period of one or two years. The decay is said to extend to the flooring as well. Notice was given by the board of its intention to adopt the following rule:

As a suitable substitute of the top filling required by subdivision 9, §354, building code, fire stops, extending from the fireproof floor construction to the under side of the flooring or sleepers and so spaced that no unfilled area shall exceed 200 square feet, may be used, provided that such fire stops shall be made of one of the materials accepted for the construction of fireproof partitions under §355 of the building code, not less than 6 inches wide, except that when a partition is carried down to the fireproof floor construction, such partition may serve as the fire stop, and provided, further, that in all buildings, corridor partitions and fire partitions, and in tenement houses, partitions separating one apartment from another, shall be carried down to the fireproof floor construction as fire stops.

Accidents in a Steel Plant

THE Sloss Sheffield Steel & Iron Company, Birmingham, Ala., reports 117 accidents in March, 1917, against 117 in March, 1916. "The only plants to show a decrease in lost time accidents for the month are Ivy and Flat Top, all of the others showing a large increase, the average for all plants for the month being 2.30 per cent as against 1.83 per cent for the previous month. This doesn't look good to us at all, and while we appreciate the fact that all of the plants are being pushed to their full capacity, it is due to this rush work that the increased accidents occur, and we should be even more on our guard to prevent them under the circumstances than formerly, for the risk is greater and it takes greater precautions to prevent them."

Appendicitis in the Dakotas

THE claims auditor of the National Casualty Company, Detroit, notes as a peculiar phenomenon the greatest number of appendicitis cases that come from North Dakota and South Dakota. "There seem to be more cases of this kind in proportion to the population than in any other two States in the Union."

Fire Dangers in Michigan

JOHN T. WINSHIP, State fire marshal of Michigan, in his annual report for 1916, says that the frequency of destructive fires in schools, churches, hotels, theaters, department stores and other buildings used for public purposes, is bringing to the attention of parents and public officials the necessity of fire-resisting structures and the installation of fire protection equipment in all buildings in which children and adults congregate, for safeguarding every possi-

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ble hazard of fire in which human life is imperiled. "The demand for safer conditions in all buildings of a public character is becoming a slogan of the people which must eventually result in the erection of buildings not made to burn. Constant inspections and regular fire drills, in addition to safe construction, must be made an imperative duty for all those to whose care is committed the safety of property and preservation of human life. In Michigan each year the authorities of many cities and towns ignore their fire limits ordinances and permit the erection of large tabernacles, constructed of inflammable material, wood and tar-paper. These structures hold thousands of people and are usually crowded beyond capacity during the services. In many instances insufficient exits are provided and the floor is covered with sawdust or shavings. These buildings are veritable fire-traps and should be absolutely prohibited."

The report contains a picture of the "Community Theater," Centerville, Mich., an up-to-date motion picture theater that complies with the Michigan safety laws.

Publications of Mine Accidents

A LIMITED supply of the following publications of the Bureau of Mines has been printed, and is available for free distribution until the edition is exhausted. Requests for publications should be addressed to the Director, Bureau of Mines. The Bureau of Mines issues a list showing all its publications available for free distribution as well as those obtainable only from the superintendent of documents, Government Printing Office, on payment of the price of printing. Interested persons should apply to the Director, Bureau of Mines, for a copy of the latest list.

PUBLICATIONS AVAILABLE FOR FREE DISTRIBUTION

BULLETIN 17. A primer on explosives for coal miners, by C. E. Munroe and Clarence Hall. 61 pp., 10 pls., 12 figs. Reprint of United States Geological Survey Bulletin 423.

BULLETIN 20. The explosibility of coal dust, by G. S. Rice, with chapters by J. C. W. Frazer, Axel Larsen, Frank Haas, and Carl Scholz. 204 pp., 14 pls., 28 figs.

BULLETIN 45. Sand available for filling mine workings in the Northern Anthracite Coal Basin of Pennsylvania, by N. H. Darton. 1913. 33 pp., 8 pls., 5 figs.

BULLETIN 46. An investigation of explosion-proof mine motors, by H. H. Clark. 1912. 44 pp., 6 pls., 14 figs.

BULLETIN 50. A laboratory study of the inflammability of coal dust, by J. C. W. Frazer, E. J. Hoffman, and L. A. Scholl, jr. 1913. 60 pp., 95 figs.

BULLETIN 52. Ignition of mine gases by the filaments of incandescent electric lamps, by H. H. Clark and L. C. Ilsley. 1913. 31 pp., 6 pls., 2 figs.

BULLETIN 56. First series of coal-dust explosion tests in the experimental mine, by G. S. Rice, L. M. Jones, J. K. Clement, and W. L. Egy. 1913. 115 pp., 12 pls., 28 figs.

BULLETIN 60. Hydraulic mine filling; its use in the Pennsylvania anthracite fields; a preliminary report, by Charles Enzian. 1913. 77 pp., 3 pls., 12 figs.

BULLETIN 62. National mine-rescue and first-aid conference, Pittsburgh, Pa., September 23-26, 1912, by H. M. Wilson. 1913. 74 pp.

BULLETIN 68. Electric switches for use in gaseous mines, by H. H. Clark and R. W. Crocker, 1913. 40 pp., 6 pls.

BULLETIN 75. Rules and regulations for metal mines, by W. R. Ingalls, James Douglas, J. R. Finlay, J. Parke Channing, and John Hays Hammond. 1915. 296 pp., 1 fig.

BULLETIN 80. A primer on explosives for metal miners and quarrymen, by C. E. Munroe and Clarence Hall. 1915. 125 pp., 15 pls., 17 figs.

BULLETIN 96. The analysis of permissible explosives, by C. G. Storm. 1916. 88 pp., 2 pls., 6 figs.

BULLETIN 99. Mine-ventilation stoppings, with especial reference to coal mines in Illinois, by R. Y. Williams. 1915. 30 pp., 4 pls., 4 figs.

BULLETIN 101. Abstracts of current decisions on mines and mining, October, 1914, to April, 1915, by J. W. Thompson. 1915. 138 pp.

BULLETIN 113. Abstracts of current decisions on mines and mining, May to September, 1915, by J. W. Thompson. 1916. 123 pp.

BULLETIN 115. Coal-mine fatalities in the United States, 1870-1914, with statistics of coal production, labor, and mining methods, by States and calendar years, compiled by Albert H. Fay. 1916. 370 pp., 3 pls., 13 figs.

TECHNICAL PAPER 4. The electrical section of the Bureau of Mines, its purpose and equipment, by H. H. Clark. 1911. 12 pp.

TECHNICAL PAPER 6. The rate of burning of fuse as influenced by temperature and pressure, by W. O. Snelling and W. C. Cope. 1912. 28 pp.

TECHNICAL PAPER 7. Investigations of fuse and miners' squibs, by Clarence Hall and S. P. Howell. 1912. 19 pp.

TECHNICAL PAPER 11. The use of mice and birds for detecting carbon monoxide after mine fires and explosions, by G. A. Burrell. 1912. 15 pp.

TECHNICAL PAPER 13. Gas analysis as an aid in fighting mine fires, by G. A. Burrell and F. M. Seibert. 1912. 16 pp., 1 fig.

TECHNICAL PAPER 14. Apparatus for gas-analysis laboratories at coal mines, by G. A. Burrell and F. M. Seibert. 1913. 24 pp., 7 figs.

TECHNICAL PAPER 15. An electrolytic method of preventing corrosion of iron and steel, by J. K. Clement and L. V. Walker. 1913. 19 pp., 10 figs.

TECHNICAL PAPER 17. The effect of stemming on the efficiency of explosives, by W. O. Snelling and Clarence Hall. 1912. 20 pp., 11 figs.

TECHNICAL PAPER 18. Magazines and thaw houses for explosives, by Clarence Hall and S. P. Howell. 1912. 34 pp., 1 pl., 5 figs.

TECHNICAL PAPER 19. The factor of safety in mine electrical installations, by H. H. Clark. 1912. 14 pp.

TECHNICAL PAPER 21. The prevention of mine explosions, report and recommendations, by Victor Watteyne, Carl Meissner, and Arthur Desborough. 12 pp. Reprint of United States Geological Survey Bulletin 369.

TECHNICAL PAPER 22. Electrical symbols for mine maps, by H. H. Clark. 1912. 11 pp., 8 figs.

TECHNICAL PAPER 28. Ignition of mine gas by standard incandescent lamps, by H. H. Clark. 1912. 6 pp.

TECHNICAL PAPER 30. Mine accident prevention at

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Lake Superior iron mines, by D. E. Woodbridge. 1913. 38 pp., 9 figs.

TECHNICAL PAPER 39. The inflammable gases in mine air, by G. A. Burrell and F. M. Seibert. 1913. 24 pp., 2 figs.

TECHNICAL PAPER 43. The effect of inert gases on inflammable gaseous mixtures, by J. K. Clement. 1913. 24 pp., 1 pl., 8 figs.

TECHNICAL PAPER 44. Safety electric switches for mines, by H. H. Clark. 1913. 8 pp.

TECHNICAL PAPER 47. Portable electric mine lamps, by H. H. Clark. 1913. 13 pp.

TECHNICAL PAPER 48. Coal-mine accidents in the United States, 1896-1912, with monthly statistics for 1912, compiled by F. W. Horton. 1913. 74 pp., 10 figs.

TECHNICAL PAPER 58. The action of acid mine water on the insulation of electric conductors; a preliminary report, by H. H. Clark and L. C. Ilsley. 1913. 26 pp., 1 fig.

TECHNICAL PAPER 59. Fires in Lake Superior iron mines, by Edwin Higgins. 1913. 34 pp., 2 pls.

TECHNICAL PAPER 61. Metal-mine accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1913. 76 pp., 1 fig.

TECHNICAL PAPER 62. Relative effects of carbon monoxide on small animals, by G. A. Burrell, F. M. Seibert, and I. W. Robertson. 1914. 23 pp.

TECHNICAL PAPER 67. Mine signboards, by Edwin Higgins and Edward Steidle. 1913. 15 pp., 1 pl., 4 figs.

TECHNICAL PAPER 69. Production of explosives in the United States during the calendar year 1912, compiled by A. H. Fay. 1914. 8 pp.

TECHNICAL PAPER 71. Permissible explosives tested prior to January 1, 1914, by Clarence Hall. 1914. 12 pp.

TECHNICAL PAPER 75. Permissible electric lamps for miners, by H. H. Clark. 1914. 21 pp., 3 figs.

TECHNICAL PAPER 76. Notes on the sampling and analysis of coal, by A. C. Fieldner. 1914. 59 pp., 6 figs.

TECHNICAL PAPER 78. Specific-gravity separation applied to the analysis of mining explosives, by C. G. Storm and A. L. Hyde. 1914. 13 pp.

TECHNICAL PAPER 84. Methods of preventing and limiting explosions in coal mines, by G. S. Rice and L. M. Jones. 1915. 45 pp., 14 pls., 3 figs.

TECHNICAL PAPER 92. Quarry accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 76 pp.

TECHNICAL PAPER 100. Permissible explosives tested prior to March 1, 1915, by S. P. Howell. 1915. 15 pp.

TECHNICAL PAPER 105. Pulmonary disease among miners in the Joplin district, Missouri, and its relation to rock dust in the mines; a preliminary report, by A. J. Lanza and Edwin Higgins. 1915. 48 pp., 5 pls., 4 figs.

TECHNICAL PAPER 108. Shot firing in coal mines by electricity controlled from outside, by H. H. Clark, N. V. Breth, and C. M. Means. 1915. 36 pp.

TECHNICAL PAPER 116. Miners' wash and change houses, by J. H. White. 1915. 27 pp., 3 pls., 3 figs.

TECHNICAL PAPER 119. The limits of inflammability of mixtures of methane and air, by G. A. Burrell and G. G. Oberfell. 1915. 30 pp., 4 figs.

TECHNICAL PAPER 129. Metal-mine accidents in the United States during the calendar year 1914, compiled by A. H. Fay. 1916. 96 pp., 1 pl., 3 figs.

TECHNICAL PAPER 134. Explosibility of gases from mine fires, by G. A. Burrell and G. G. Oberfell. 1915. 31 pp., 1 fig.

MINERS' CIRCULAR 5. Electrical accidents in mines, their causes and prevention, by H. H. Clark, W. D. Roberts, L. C. Ilsley, and H. F. Randolph. 1911. 10 pp., 3 pls.

MINERS' CIRCULAR 7. Use and misuse of explosives in coal mining, by J. J. Rutledge, with a preface by J. A. Holmes. 1913. 52 pp., 8 figs.

MINERS' CIRCULAR 10. Mine fires and how to fight them, by J. W. Paul. 1912. 14 pp.

MINERS' CIRCULAR 11. Accidents from mine cars and locomotives, by L. M. Jones. 1912. 16 pp.

MINERS' CIRCULAR 13. Safety in tunneling, by D. W. Brunton and J. A. Davis. 1913. 19 pp.

MINERS' CIRCULAR 14. Gases found in coal mines, by G. A. Burrell and F. M. Seibert. 1913. 23 pp.

MINERS' CIRCULAR 16. Hints on coal-mine ventilation, by J. J. Rutledge. 1914. 22 pp.

MINERS' CIRCULAR 17. Accidents from falls of rock or ore, by Edwin Higgins. 1914. 15 pp., 8 figs.

MINERS' CIRCULAR 20. How a miner can avoid some dangerous diseases, by A. J. Lanza and J. H. White. 1916. 26 pp., 4 figs.

MINERS' CIRCULAR 21. What a miner can do to prevent explosions of gas and coal dust, by G. S. Rice. 1915. 24 pp.

PUBLICATIONS THAT MAY BE OBTAINED ONLY THROUGH THE SUPERINTENDENT OF DOCUMENTS

The editions for free distribution of the following Bureau of Mines publications are exhausted, but copies may be obtained by purchase from the superintendent of documents, Government Printing Office, Washington, D. C. Prepayment of the price is required and should be in cash or money orders.

BULLETIN 23. Steaming tests of coal and related investigations, September 1, 1904, to December 31, 1908, by L. P. Breckenridge, Henry Kreisinger, and W. T. Ray. 1912. 380 pp., 2 pls., 94 figs. 50 cents.

BULLETIN 25. Mining conditions under the city of Scranton, Pa., report and maps, by William Griffith and E. T. Connor, with a preface by J. A. Holmes and a chapter by N. H. Darton. 1912. 89 pp., 29 pls. 50 cents.

BULLETIN 26. Notes on explosive mine gases and dusts, with especial reference to explosions in the Monogah, Darr, and Naomi coal mines, by R. T. Chamberlin. 1911. 383 pp., 1 fig. 10 cents. Reprint of United States Geological Survey Bulletin 383.

BULLETIN 42. The sampling and examination of mine gases and natural gas, by G. A. Burrell and F. M. Seibert. 1913. 116 pp., 2 pls., 23 figs. 20 cents.

BULLETIN 61. Abstract of current decisions on mines and mining, October, 1912, to March, 1913, by J. W. Thompson. 1913. 82 pp. 10 cents.

BULLETIN 69. Coal-mine accidents in the United States and foreign countries. Compiled by F. W. Horton, 1913. 102 pp., 3 pls., 40 figs. Paper, 25 cents.

BULLETIN 72. Occurrence of explosive gases in coal mines, by N. H. Darton. 1915. 248 pp., 7 pls., 33 figs. 35 cents.

BULLETIN 79. Abstracts of current decisions on mines and mining, March to December, 1913, by J. W. Thompson. 1914. 140 pp. 20 cents.

TECHNICAL PAPER 24. Mine fires, a preliminary study, by G. S. Rice. 1912. 51 pp., 1 fig. 5 cents.

TECHNICAL PAPER 27. Monthly statement of coal-mine accidents in the United States, January to August, 1912, and statistics for 1910 and 1911, compiled by F. W. Horton. 1912. 24 pp. 5 cents.

TECHNICAL PAPER 29. Training with mine-rescue breathing apparatus, by J. W. Paul. 1912. 16 pp. 5 cents.

TECHNICAL PAPER 40. Metal-mine accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 54 pp. 5 cents.

TECHNICAL PAPER 41. The mining and treatment of lead and zinc ores in the Joplin District, Missouri, a preliminary report, by C. A. Wright. 1913. 43 pp., 5 figs. 5 cents.

TECHNICAL PAPER 73. Quarry accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1914. 45 pp. 5 cents.

TECHNICAL PAPER 77. Report of the committee on resuscitation from mine gases, by W. B. Cannon, G. W. Crile, Joseph Erlanger, Yandell Henderson, and S. J. Meltzer. 1914. 35 pp., 4 figs. 5 cents.

TECHNICAL PAPER 94. Metal-mine accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 73 pp. 10 cents.

MINERS' CIRCULAR 3. Coal-dust explosions, by G. S. Rice. 1911. 22 pp. 5 cents.

MINERS' CIRCULAR 8. First-aid instructions for miners, by M. W. Glasgow, W. A. Raudenbush, and C. O. Roberts. 1913. 67 pp., 51 figs. 10 cents.

MINERS' CIRCULAR 15. Rules for mine-rescue and first-aid field contests, by J. W. Paul. 1913. 12 pp. 5 cents.

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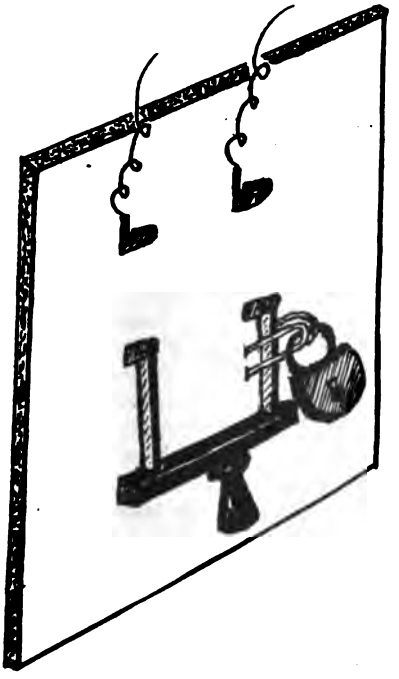
"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 282 VARIOUS INDUSTRIES — SUDDEN STARTING OF MOTORS.— The writer has noted with not a little surprise the very worthy suggestions to prevent accident attending the sudden starting of motors, machinery, etc., namely: The blowing of signals, flashing lights, etc; even the *all clear* call of the workman doing the hazardous task. All these are in a measure safeguards but they lack effectiveness against the unexpected. A man may signal "all clear," drop a tool, and thoughtlessly stoop to pick it up. The result is evident. I am a firm believer in protecting man against his own thoughtlessness as well as that of others. The suggestion I am about to make, I feel sure, will prevent the always pitiful explanations that attend the aftermath of accidents. The Man On The Job is the one most vitally affected; his family are the only losers in case of accident. Therefore, I think he is the proper person to protect his own welfare. I herewith give you as best I can a sketch of a contrivance to attach to switchboards to prevent the circuit on a line upon which work is being done, from being thrown in. Let the man lock this himself, put the key in his pocket and unlock it when he has finished, using Yale locks or any locks of standard make that have no duplicate keys. I believe that it would only be a matter of a little thought and contrivances of the sort could be attached to the starting gear of most, if not all, machinery. There may be a little time lost in this method, but what are a few minutes compared to a life?



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No. 283 VARIOUS INDUSTRIES — SUDDEN STARTING OF MOTORS.— I recommend the locking of the main switch which is as a rule either above the starting box or on a column near the motor. On many of the starting boxes there are two levers which necessitate the use of two locks, while with the switch, if it is properly guarded, the handle can be thrown to off position and locked, and if it is a two way switch a slotted block can be placed across the forks and be locked. I find in some of the large machine shops that the large machines are driven with independent motors and the starting box is near a column on which a line shaft starting box is mounted. I think by locking the switch we may be able to avoid the mistake of locking the wrong box.

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No. 284 VARIOUS INDUSTRIES — SUDDEN STARTING OF MOTORS.— I have never investigated an accident due to the sudden starting of motors but I have talked with quite a few textile manufacturers on the question of the value of individual drives. From my experience there seems to be an organized movement to "knock" individually driven machines, the principal objections being the increased fire hazard, loss of power through leaks on the line, etc. I do not think there is any positively safe method other than each employe affected by this hazard possessing an individual lock to lock out the switch. Signs are a poor preventive as some employes through carelessness would leave the sign on the switch at all times. Others who may be accustomed to seeing the sign hanging on the switch that it "should be left open" and at the same time seeing the switch in, get accustomed to ignoring the sign entirely. Locks may be bought as low as 10 cents and figure very little in the cost when considering this method. Where they do not care to use locks it is well at least to insist that the switch can be seen from any place a man would be required to work on a line shaft.

No. 285 ALL INDUSTRIES—THE PRICE HE PAID—Of course, you understand, I'm not speaking from experience when I talk about a one-armed man, but anyone with a bit of imagination ought readily to see just what a handicap it must be. Perhaps I'm a little too severe in removing the whole arm, so let's say this fellow has lost only his hand, because you know there are a lot of fellows who say that these safety men always try to make things seem worse than they really are. So we'll leave him a big, strong, healthy arm—elbow and everything. What have you got? A potato masher—nothing else. A big strong healthy arm with nothing on the end is about as useful as toothache gum in an old ladies' home.

Now it's all right to joke about these things where you're not the goat, but it's a mighty different tale when it hits home. I have a cousin, or rather a half a one, who lost his hand just above the wrist. He fell down an elevator shaft. He walked into the elevator when it wasn't there. At the time it happened his attention was about "fifty-fifty;" half on the open elevator door and the other half off on a good time. He saw the open door and thought that the elevator must be there. Thought once killed a man, but lack of thought cost him his hand. I suppose, like a good many other fellows who never got hurt before, he thought if the elevator wasn't there, the good Lord would push the basement floor up to him. But He didn't, nor does He ever. He put a head on your shoulders instead. "I give you brains. now develop common sense." "Safety First" is 99 per cent common sense and without it you're hopeless. All the safety bulletins, posters and pamphlets that are gotten out for your benefit will fall on deaf ears. Like my cousin, you'll have to have it thumped into you. Then it's too late, the harm is done.

I'm about a mile and a half from where I started, so let's get back on the track again. I'm going to tell you about my cousin's stay with me. He visited us for two weeks last summer. I was standing on the front veranda when I saw him coming up the street. One side of him looked like a human being and the other side with the bunt arm looked like a scarecrow. I walked down the street to meet him. He dropped his suit case on the sidewalk and shook hands after a while. I say after a while, because he had only his left hand to shake with and as I'm a bit awkward with my left, we fanned the air a couple of times before we met. It wasn't so terrible, but nevertheless, it was a little embarrassing. You should have seen the poor fellow at the table. He couldn't butter his bread; he couldn't cut his meat. On retiring, he could undress himself all right, but someone had to dress him. Can you imagine him putting on his collar and necktie or lacing his shoes? He told me that if he had to make his living with his hand instead of being a salesman, his earning ability would be about zero. When he left, I felt like a mother separated from her child. Believe me, if you men who are

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continually taking chances with your hands and arms, sticking them in places where danger lurks, could have seen how helpless he was, you would hide your hands in your pockets.

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No. 286 ALL INDUSTRIES—GIVING BONUSES TO ENCOURAGE SAFETY.—I believe that carefulness should be inculcated on the grounds of common sense and not through rewards. We *reward* children for being honest—we *expect* men to be honest. If they are dishonest, punishment is in order. I favor punishment for carelessness but not rewards for carefulness.

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No. 287 ALL INDUSTRIES — SAFETY FROM A "HORSE SENSE" VIEWPOINT.—Don't get the idea that I'm trying to "kid" you into believing that the employer is your guardian angel, and that all this business of safeguarding machines, or what is known as the "Safety First" movement, was started for your benefit. NOTHING doing. You know as well as I do that this movement was started soon after the compensation laws went into effect. It is for the purpose of saving money. For money is as necessary to a big concern as hands are to the workingman. "Safety First" is a business proposition with the workingman—You and I on the long end. The company says to you: "Be careful; keep all safeguards in place; don't take chances; any time you get injured be sure to have it immediately attended to at our hospital. Do all these things and you will save us a lot of money. In return, we'll save you from the scrap-heap; we'll help you to save your arms, your legs and eyes. We'll help you to draw a full pay envelope (money saved) each week; we'll help to keep you whole so your little ones may have a chance to get an education. It won't cost you a nickel. All you have to do is to 'play safe;' not for our sake alone, but for your own sake, your wife's and children's sake—for humanity's sake. Remember, legs, arms and eyes are priceless. They can't be bought. Once they're gone, they're gone forever!"

No. 288 ALL INDUSTRIES — PAYING BONUSES FOR SAFETY.—We have been paying rewards for two or three years for any suggestions for the elimination of unsafe practices and improvements in safeguarding machinery. We are thoroughly convinced that this method appeals to the employes. Many of our best devices for protecting life and limb have been submitted to us in this way.

Furthermore, it makes a permanent record of those employes who have originality and inventive ability. We also find that it makes them the best boosters for safety when their suggestions are adopted. We give rewards for improvements in our commercial products. Therefore, we feel the employes are also entitled to awards for the conservation of the human element.

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No. 289 ALL INDUSTRIES—LACK OF POWER TO ENFORCE THE LAW BY THE SAFETY ENGINEER.—The writer finds that, in the work of a safety engineer, he is badly hampered by not having authority to enforce the labor laws in the States in which he works. We find from 1911 to 1914 there were 1,641 fatal accidents in the State of New York on construction work. These days nearly every contractor carries some kind of insurance protecting him against accidents that might occur in his operations. As the casualty companies find that it is important to have an inspector on these operations for the protection of their interests, we, the inspectors, find that in many cases we are tied hand and foot by lack of authority to enforce the laws requiring things to be done that are not done, as possibly there is no Man On The Job with this power until there has been some fatal accident. The State inspector then comes around and gives the contractor a hauling over the coals. I should say that if the inspectors of the casualty companies of the United States were all deputies of the State inspectors with the power to enforce the State labor laws, the figures above could have been considerably reduced.

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It seems to me that each insurance inspector should have this appointment and undergo an examination before a board of examiners as to his knowledge of the cause of industrial accidents and the prevention of them. He should be given the authority to enforce the labor law on the work he inspects.

We admit that it is not necessary to enforce the law on work of this kind in all cases. Many times it is pure ignorance which allows many defects that would not exist if they were pointed out to the contractor or owner of the business by a man who is competent to show defects and offer advice as to how to overcome them, explaining to the management how these things may, and have caused accidents.

In many cases where there is a labor law existing it is neglected, as a bad accident is sometimes necessary to force a complaint in regard to the dangerous defects that exist on a certain piece of work.

A review of experience as to enforcing the provisions of the labor laws leads inevitably to the conclusion that the matter of enforcement has never been sufficiently studied nor adequately provided for. One step at least towards prevention of falls in building work should be studied to the end that the existing safety provisions of the law shall be everywhere observed. The labor laws should be specific in these matters and every safety engineer should so familiarize himself with these laws that he can tell at a glance just what to do and say as the opportunity presents itself.

It is not so necessary to depend on legal requirements alone for the promotion of safety as it is to emphasize the seriousness of the particular hazard we are discussing, and to suggest means for prevention of accidents in connection therewith.

There is every reason to believe that the use of the measures suggested above would prevent a large proportion of the startling number of fatal accidents which occur in the mills and factories and working places of our country.

No. 290

ALL INDUSTRIES — BONUSES TO ENCOURAGE SAFETY. —The writer is much interested in the question regarding bonuses for encouraging safety. Personally, he does not believe in giving bonuses to men as an inducement for carefulness in reduction of accidents. He has always maintained that the matter of accident prevention is as much a part of the foremen's work as producing output. The whole crux of the problem of getting your men interested in accident prevention centers in the foremen. If your foremen believe in accident prevention work and consider it as necessary as any other function required of them, then your men will reflect this attitude by giving thought and care to their work.

There is no more reason for giving a bonus to a foreman for giving proper attention and time to the prevention of accidents, than there is for giving him a bonus for having his men report promptly to work every morning. This is a part of his work and it is what he is hired for. If his men are losing time and money for the company by being injured then he is not efficiently carrying on his work and should be replaced by a foreman who considers that a part of his duty.

Contrasted to giving bonuses for encouraging safety work, we do believe in giving some sort of recognition for voluntary safety suggestions. Personally, we like the plan of giving credit for suggestions by means of cash prizes; for suggestions submitted pertaining to departments other than the particular ones in which the men are employed. We feel that every man should make any suggestion pertaining to his own individual work and department voluntarily without expecting a prize, along the same line of thought as outlined in the case of the foremen. But if a man submits a suggestion which he happened to run across in connection with work other than his own, then he should be rewarded.

There is an important principle involved in this subject of bonuses, and the question the writer always asks himself is this: If we start giving cuff but-

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tons for good results this month, stick pins next month, then give watch fobs the next month and watches the next month, where is the whole proposition going to end? If you do not keep giving something new or better every time the interest will lag and die down. In other words, it is like a snowball rolling down a hill. There is no stopping once it gets started, and the minute you do stop after you have started you tend to curb the interest and stop any initiative on the part of the men.

These are about the only thoughts that occur to us at the present time. But we are open minded and are willing to be "shown" if it is a good thing to give bonuses.

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No. 291 ALL INDUSTRIES — BONUSES TO ENCOURAGE SAFETY.—A bonus or prize held up for doing the right thing puts a premium on doing wrong. Without question the only incentive to be held out for safety is the reward of being safe and being able to retain our members with the enjoyment incident thereto.

Rather then paying a man for becoming educated to safety ideas it would be better if some means could be brought about whereby The Man On The Job could pay for his education in safety matters. This may be illustrated by the man who pays $8 or $10 for a pair of glasses to make good some defect in vision and works alongside of someone who refuses to wear goggles. Perhaps he himself may have refused to wear goggles prior to this time, yet now that he has paid out his good money for eye protection he will not only wear his uncomfortable spectacles but will also wear his goggles on the same job to protect his spectacles.

Every employe who performs his duties in a shop in a safe and careful manner receives his proper reward in steady ability to perform such work with freedom from the disagreeable and often painful results of not doing his work in a safe manner.

It strikes me that a bonus system for the encouragement of safety would start a line of endeavor that would be hard to finish and would not work to the good of the movement in its final analysis.

Prizes for April Articles

First Prize. No. 278. E. H. Hart, Safety Engineer, Ocean Accident & Guarantee Corporation, St. Louis, Mo.

Second Prize. A tie. Nos. 277 and 279. W. E. Williams, Safety Engineer, Packard Motor Car Company, Detroit, Mich., and E. H. Hart, Safety Engineer, Ocean Accident & Guarantee Corporation, St. Louis, Mo.

Honorable Mention. No. 276. Robert D. Young, Division of Accident Prevention, Department of Labor and Industry, Harrisburg, Pa.

Other meritorious articles were contributed by Ira L. Lockney, Deputy, Industrial Commission of Wisconsin, Eau Claire, Wis., and Frederick A. Williams, Safety Engineer, Inspection Division, Standard Accident Insurance Company, Rochester, N. Y.

Comments by Members of the Committee

My vote is cast for 277. I cannot help differing with the writer of 277 when he says "there is something the matter with the executive heads of a company when you have to put the safety proposition up to them in dollars and cents." I cannot help but feel that he thinks as I do, but is too considerate to say so. It *is* the dollars and cents end of the proposition that *properly* is considered. Were it not for

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this phase the movement to conserve life by prevention of industrial accidents would never have gotten any headway. There are plenty of employers today whose cost accounting gets so little consideration they do not know what saving could be effected; but bring them to a realization of this loss or waste and they suddenly see safety from the humanitarian point of view alone, as most of us do. Another stimulus to arouse enthusiasm is good, but not so sure as the cost proposition. That is to get the two best fingers on the right hand haggled in a lawn mower that is unguarded.

The author of 276 seems to me to be a person who considers "Safety First" as it was intended when the expression was coined. As the real meaning of "Safety First" he chooses safety results before considering a trivial loss of time.

The writer of 278 offers a very good exposition of the tactful way of advancing the cause of "Safety First."

The writer of 277 has a good practical method for "getting" the lukewarm management and it has my cordial endorsement.

I cast my vote for 278 as being entitled to first prize.

Corrosion of Tinned Copper

A RECENT publication of the United States Bureau of Standards is entitled "Structure of the Coating on Tinned Sheet Copper in Relation to a Specific Case of Corrosion," by Paul D. Merica, associate physicist of the bureau. It relates to a curious case of corrosion or pitting in tinned sheet copper roofing. The pits occur in general along the line of surface scratches and are apparently unrelated to the service conditions, or to the direction of the rolling of the sheet. The paper gives the results of a study on the structure of tin coatings on copper. It is shown that this coating consists of at least three layers—first and next to the copper, a layer of Cu_6Sn, then an alloy of approximately 60 per cent (by weight) of tin, and lastly a layer of variable thickness, a eutectic of copper and tin (and probably also lead when it is used in the tinning mixture). The pamphlet is now available for distribution and any person interested may obtain a copy by addressing a request to the Bureauof Standards, Department of Commerce, Washington, D. C., for Technologic Paper No. 90.

Clean Up and Paint Up

E. B. SPERRY, of the Southern Railway, in the Quarterly Bulletin of the Railway Fire Protection Association, advocates increased efficiency as one of the great issues of the day in all parts of national life, whether it be governmental, business, the home, or the individual. He commends the "Clean Up and Paint Up Campaign," launched by newspapers in various cities and urges the railroads to enter into the movement. "If it is of value to the community it should be of greater value to the corporation; let the Quarterly inaugurate a 'Clean Up and Paint Up' campaign applying to the home of the employe as well as to the property of the transportation company. Care and cleanliness in the home, office or factory produce greater returns for the time and labor spent than any other investment that owners of industrial establishments can make."

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The Fight Against Fire

Conservation of Life and Property by Safe Construction, Fire Prevention Methods and Fire Protection

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles, Suggestions, etc., relating to Safe Construction, Fire Prevention and Fire Extinguishment. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 123 FIRE PREVENTION — ITS MEANING AND POSSIBILITIES. —The subject of "Fire Prevention" is gradually finding its way into the industrial life of this country, but we are not sufficiently educated into the real meaning of the words to fully realize their vast importance, and what fire prevention really means to the future welfare of our country. Much has been said and done by men interested in the propagation of this work, and the per capita fire loss in this country has been cited for comparison to the per capita fire loss in European countries. From this basis, efforts have been made to bring about a radical change in our methods of building construction, not alone in the interest of the fire resistant type of building, but to make "safety to life" an important factor. Efforts have been made to bring this about, not only in factory and industrial buildings, but in dwelling houses as well. In both respects these efforts have borne fruit, but there is still much to be said and done in this direction. Better fire-resistant types of buildings are now being constructed for industrial enterprises. It is to be hoped that the time is not far distant when this feeling will spread and we shall see a decided change in our methods of dwelling house construction; when fireproof construction will be the rule, not the exception.

We are practically a nation of philanthropists. We combine to protect one another against fire losses. The one who fails to enter the combine, is looked upon as being little short of foolhardy. The reports of fires are read with considerable interest, and usually read to the end because the estimated loss is always noted at the conclusion of the article. There we read, "loss fully covered by insurance," or perhaps, if one has only entered half-heartedly into the combine, it will read, "loss partly covered by insurance." The latter does not cause any comment, but occasionally we read, "No insurance." Then what are our thoughts? Such a condition we consider the acme of carelessness. We do not stop to consider what caused the fire, nor consider what steps we could take to prevent a similar recurrence. Too often we take it as a matter of course; it was only one of many, probably due to carelessness; and in the press of other events the matter is forgotten.

But, even under our present conditions, if we will take fire prevention in its true sense, and carry on the Fight Against Fire with the determination to conquer, and with undiminishing energy, success will follow. Then our per capita fire loss will be reduced, and a proportionate reduction in our insurance rates will follow as a matter of course.

However, we cannot expect such results until there is a more general feeling, or desire to co-operate in this work by a greater percentage of our manufacturing interests. Fire prevention absolutely demands co-operation. Every one has a more or less vague comprehension of the meaning of the two words, but *all* they stand for is not understood, as it should be. It is very well to post a series of fire prevention "Don'ts" providing steps are taken to enforce the "Don'ts." In many cases, interest ceases with the posting of such placards or notices.

The mill or factory is practically the only school the greater part of our population has after passing the age of 16. Many of the traits learned by mill and factory workers govern their actions

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through life. It is therefore, in a sense, the duty of the heads of industrial plants, to bear their share in the education of all mill and factory workers in the true meaning of fire prevention. It is to be expected that there will be some expense attached to carrying on such an educational work, but the results, even in each individual plant, will warrant the outlay.

It must not be expected that this course will be a simple one to carry out. It will mean constant vigilance and constant application by those who enter the field, but the ultimate result will be worth the labor. It must not be started with a big show of publicity. Rather inaugurate it in a very unassuming manner; a mere notice that a fire prevention system will be inaugurated, and every one will be expected to co-operate. Include a few of the simpler fire prevention rules. It must be followed up closely and care must be taken to see that co-operation is realized. Whenever a tendency to slight matters is shown, then the real force behind the movement must be brought into evidence and the lagging interest revived. Every one concerned must be given to understand that the least deviation from the objective point will be noticed and commented upon. When this becomes generally known the tendency to slacken in the strict observance of the rules of fire prevention will cease. This condition cannot be realized except by means of eternal vigilance.

We are beginning to realize that expensive municipal fire departments will not keep down our enormous fire losses. Our public fire departments are as efficient as skill and study can make them, but the fault lies with ourselves. We have failed to give them the proper co-operation. We are beginning to realize this, and we must turn to fire prevention as the only relief; the only way to reduce our heavy insurance rates. We cannot expect to reach the standard of European countries as to the per capita fire loss. Our cities built of wood put that out of the question for years to come. But we can reduce the number of our fires by the education of the masses. They can be reached by constant reminder of the value of fire prevention in their workshops. It will become part of their trade and the men will realize that there must be something in fire prevention, or the firm they are working for would not be so insistent on having fire prevention rules carried out to the fullest extent. They will soon begin to reason that if fire prevention pays the "boss" it will pay them in their own homes, and they will gradually practice fire prevention in their homes. When matters reach this stage, then and only then, can we say that fire prevention is an accomplished fact.

No. 124 A WORSE THAN NEEDLESS HAZARD.—Such is the open pail, containing from two to ten quarts of gasoline (or more) for the purpose of cleaning small gears, machinery parts and tools and for washing hands, so frequently encountered in otherwise well ordered shops.

To any person familiar with the character and properties of gasoline the extreme hazard of the practice will be evident, with perhaps one exception, viz., the owner or manager of the shop where it is so used. To suggest the idea of danger to him is to call down ridicule if not wrath. He will instantly concede the great danger in any other shop and agree that it should be prohibited there and the sternest measures of repression used. But in his shop, danger? Never, or at least until the expected happens.

Any chemist can prepare dozens of solutions that are non-corrosive as to metals, and better and quicker solvents and cleaners than gasoline and cheaper, since gasoline used in this manner is usually thrown away (apart from the fact that in its disposal new hazards may be created). The objectionable feature of such solutions is that the hands may not be immersed in them with impunity. Immersion of the hands, however, is not a real convenience or at all a necessity, but merely a matter of habit. Tongs or long pliers serve all purposes.

For washing hands the injurious

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action of gasoline on the skin should suffice, let alone the actual danger from electrical action often set up in the act of dipping and rubbing. It is an imperfect cleanser at best and leaves the hands dry, sore and poisoned.

For removing any grease or dirt that is to any extent soluble in or removable by gasoline, if a small quantity of heavy oil (lard oil is preferable) be well rubbed into the hands and the washing then done with any good hand cleaner or soap, using but little water at first—warm water if obtainable—all dirt, grease, paint or varnish will be completely removed and the hands left soft, clean and comfortable instead of dry and painful. All that is needed is a small can or bottle of suitable oil conveniently kept, and soap.

Of course those special dyes upon which soap acts as a "fixative" cannot be removed in this manner, but since they are all insoluble in gasoline this has no bearing on the subject.

Here at least is a chance for some effective missionary work, since the use of gasoline for this purpose is apparently because of ignorance of any other effective method.

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No. 125 HOUSEWIVES AND HOME HAZARDS.—I have seen many articles on educating the workmen in fire prevention, about the farmer's responsibility, the duties of city officials, etc., but I have seen few suggestions for educating women in fire prevention.

We think of men as fire fighters—brave, strong men. Fire marshals are men. All through it has been a man's job. The housewife's responsibility should be considered. Housewives are the ones to prevent fires in the homes.

Loss of a home by fire often means the loss of lives of children and old people as well as of those trying to rescue them.

Dwellings have the least protection of any buildings, as they are often at a distance from fire-fighting apparatus, are built of non-resisting materials and have few fire-fighting appliances.

Usually women are at home alone through the day. They have much of the ordering of the premises inside and outside. In order to know and want and secure safety they should be educated in fire prevention.

Some cities are taking up this important phase of fire prevention. The fire department of Grand Rapids, Michigan, by efficient methods, has reduced the fires in the business district until 90 per cent of the loss occurs in the residence district. Now they are educating the housewives as the next step.

Large printed cards of important rules and suggestions, ready to hang up, are sent out, and each household is urged to co-operate with the department. The nearest call-box number and location with directions for sending an alarm are on each card.

The danger of leaving children at home alone is emphasized. Also the necessity of clearing the rooms at night so that scattered clothes and furniture may not impede nor prevent rescue in case of fire.

It is pointed out how important it is to learn the dangers as well as the proper care of heating and lighting appliances; also the importance of care in everyday matters too often neglected, such as disposal of ashes and rubbish, frequent inspection of wiring, gas pipes, chimneys, flues, etc., care in the placing of stove pipes, swinging lamps, gas brackets, etc.

The fire marshal of Wisconsin has called attention to the hazards in the use of benzine stove polish and the large number of serious accidents occurring in the United States through its use. Only fire-proof stove polish should be used.

In St. Louis there is an ordinance prohibiting the storage or keeping of any inflammable compound for use as stove polish or insecticide.

Housewives could accomplish much by demanding proper construction and at least some fire-fighting appliances in the houses they rent or have built. They should be awakened to the underlying causes of high insurance rates.

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They should be aroused to the needs of frequent inspection and what they have a right to receive from their fire departments in preventing fires.

Did you ever think of what the individual owes, personally, to his community, especially to the fire department? The community may suffer an irreparable loss through your careless fire, and no matter how blameworthy you may be, or how dangerous the situation, the firemen must come to your aid and sacrifice even life itself, if necessary, to put out your fire.

Don't let it be a fire you might prevent!

Prizes for March Articles

First Prize. No. 121. Charles E. Worthington, Inspector, John C. Paige & Co., Boston, Mass.

Second Prize. A tie having resulted in the votes by members of the committee between articles No. 120 and No. 122, the second prize is awarded both to Robert J. Evans, Fireman, New York Fire Department, Brooklyn, N. Y., and R. R. Faitoute, Secretary, Fire Prevention Bureau, Newark, N. J.

Comments by Members of the Committee

I have chosen 122, the article on matches because everybody uses matches and it is possible for everybody to help with this prevention. If we only knew the simple facts about articles of everyday use and the way accidents come about, it would be easier to be careful.

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Article 120, "Eliminating Carelessness," is my choice. There are laws against every other act of carelessness where injury occurs to the helpless or innocent and where the injury is not often so great as in carelessly started fires. Certainly if there were laws with prescribed punishments against careless starting of fires, such fires would be immediately reduced to a minimum.

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I vote in favor of 121. It is not merely sufficient that one should have an approved fire extinguisher but that its care and use should be thoroughly understood. The paper in question is of much educational value.

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Article 121 is a valuable gospel for fire prevention because it deals with chemical extinguishers which are relied upon, often in places where heavy fire losses are possible, to put out fires in their incipiency. In order to be reliable, extinguishers must be of a certain type. Therefore, to make certain that the extinguisher will do its work in an emergency, care should be taken to select one that is properly constructed.

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Lieutenant Samuel M. Rehfield, Hook and Ladder Company No. 129, New York City, winner of the first prize announced in the March number, writes: "From a fireman's point of view I feel satisfied that 'The Fight Against Fire' articles encourage builders and other persons interested in fire prevention and in the protection of employes in the event of fire, to perceive the necessity of an auxiliary that will control and confine a fire to the smallest possible area. Your letter was very encouraging and I am gratified that the subject was of some value to your many readers. Continued success should follow SAFETY ENGINEERING'S untiring efforts to eliminate the danger of conflagrations and to promoting the safety of workmen and mechanics employed in hazardous occupations."

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases.

Photo by Social Press Association, N. Y.

Ruins of grandstand at the Belmont Park race track, New York, after the fire on April 7. The stand was constructed of steel girders protected by cement on corrugated iron. The fire was undoubtedly of incendiary origin as it was found to have been set in eight places. The grandstand and one other building were destroyed, while 6 others, including the Belmont Park clubhouse, were considerably damaged. The loss is approximately $1,000,000.

CHURCHES

March 4, 1917. Ladonia, Tex. Christian church. West Main street. One 2-story building destroyed. Walls, brick veneer. Floor, wood. Roofs, tin. Cause, supposedly defective furnace. Fire started in furnace room in basement. Discovered by smoke coming up through ventilators about 11:30 a. m. Alarm, telephone. Duration, about 2 hours. Stopped when building was consumed. Fire was favored. It was drawn up between two walls so that firemen could not reach it. Fire had grown beyond control when department arriyed. Persons in building, about 85. Means of escape, 1 single door and 3 double doors. Value of building and contents, $15,000.

March 7, 1917. Brooklyn, N. Y. Baptist Temple. Schermerhorn street and 3rd avenue. Church. One building, 30 feet high, destroyed. Walls, brick. Floors, wood. Roofs, slate. Cause, unknown. Fire started in 1st story, in rear. Discovered by policeman about 11 p. m. Alarm, street box. Duration, 2 hours, 30 minutes; extended throughout the building. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, approximately $100,000. Property loss, approximately $90,000.

March 10, 1917. Aurora, Ill. Lutheran church (Swedish). 79 Galena street. One

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building destroyed. Walls, brick veneer. Floors, wood. Roofs, wood shingles. Cause unprotected furnace pipe through wood partition. Fire started between walls. Discovered by seeing smoke issuing from roof about 4:30 p. m. Alarm, telephone. Duration, 2 hours. Stopped, at 1st floor. Fire was favored by air space between floor and walls. Firemen handicapped by rapid headway of fire. Had barely entered the building when the ceiling began to fall. Persons in building, none. Injured, 3 firemen. Means of escape, usual exits. Value of building and contents, $12,000. Property loss, $8,000.

DEPARTMENT STORES

February 25, 1917. Reading, Pa. Bright & Co. 504 Penn street. Women's wearing apparel. One building destroyed. Walls, brick. Floors, concrete. Roofs, tin. Cause, unknown. Fire started in 2nd story. Discovered by passerby about 12:10 p. m. Alarm, regular system. Duration, about 8 hours. Stopped, in same building where it started. Fire was retarded by substantial construction. Persons in building, 20. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $12,000. Property loss, $8,000 on contents.

DWELLINGS, ORDINARY, CITY

March 4, 1917. Lansing, Mich. Wilber Van Epps, 119 Howard street. Dwelling. One 1½-story dwelling destroyed. Walls, wood joists, siding on outside, building paper inside. Floors, wood. Roofs, wood shingles. Cause, kindling fire with kerosene. Fire started near stove about 8:25 a. m. Alarm, telephone. Duration, 45 minutes. Stopped when building was destroyed. Fire was favored by flimsy construction; all wood and building paper, no fire-resisting material whatever. Persons in building, 4. Father burned about face, mother and 2 children burned to death. Means of escape, small window in room upstairs. Value of building and contents, nominal. Property loss, total.

March 23, 1917. Brockton, Mass. G. C. Reynolds. 162 West street. Dwelling. One 1½-story building destroyed. Walls, wood. Floors, wood. Roofs, wood shingles. Cause, unknown. Discovered by neighbors, about half mile distant, about 2:55 a. m. Alarm, telephone, bell alarm sent from headquarters. Duration, 30 minutes; confined to one building. Fire was favored by cheap wood construction. Firemen handicapped by distance from hydrant, 3,000 feet away. Persons in building, 2. Killed, 2. Both burned to a crisp. Means of escape, front door. Value of building and contents, nominal. Property loss, total. Investigation shows that both the men burned were probably intoxicated. Those who arrived at the scene first declare it was impossible to see the men owing to headway of fire. Building was a mere shack. Even though water had been available, the department could have done nothing as building was practically consumed when it arrived.

DWELLINGS, ORDINARY, COUNTRY

March 1, 1917. Madison, Conn. T. A. Humason and H. L. Baker. Madison Beach, west wharf. Summer cottages. Two 2-story dwellings destroyed. Walls, wood shingles. Floors, wood. Roofs, wood shingles. Cause, unknown. Fire started in southwest corner of Humason cottage. Discovered about 5 a. m. Alarm, telephone. Duration, 2 hours. Fire was favored by all wood construction. Firemen handicapped by delay of 20 minutes waiting for automobile to haul wagon to the fire. Persons in building, none. Means of escape, none. Value of buildings and contents, $18,000.

CONFLAGRATIONS

February 14, 1917. Girardville, Pa. Business buildings. Main street. Hardware store, grocery, clothier, furniture dealer, restaurant, etc. Eighteen 2- and 3-story buildings destroyed. Walls, wood. Floors, wood. Roofs, slate, tin and shingle. Cause, thawing frozen pipes. Fire started in basement. Discovered by smoke coming through roof about noon. Alarm, persons ran to firehouse. Duration, about 6 hours. Stopped at a brick building. Fire was favored by wood construction. Firemen handicapped by frozen fire hydrants. Persons in buildings, not reported. Injured, 2. Means of escape, stairways; no fire escapes. Value of buildings and contents, $312,300. Property loss, $76,443.

March 6, 1917. Harrisville, N. Y. Business buildings. Main street. Clothing stores. Nineteen 2- and 3-story buildings destroyed. Walls, wood and concrete blocks. Floors, hardwood. Roofs, tin and sheet fiber. Cause, rubbish in basement. Fire started next to street wall. Discovered by seeing the smoke about 11:15 p. m. Alarm, regular system. Duration, 6 hours. Stopped in building adjoining postoffice. Fire was favored by construction and inflammable stocks. Firemen handicapped by frost in hydrant. Caused delay of 10 minutes. Persons in buildings, none. Means of escape, stairways. Value of buildings and contents, $150,000 to $200,000. Property loss, total.

March 11, 1917. Binger, Okla. Baker Brothers and others. Main street. General store, drug store, grocery, barber shop, postoffice, pool hall and restaurant. Nine 1-story buildings destroyed. Walls, wood, one building concrete. Floors, wood. Roofs, tin, wood shingle, tar and gravel. Cause, lighted match or cigarette. Fire started in pool hall. Discovered by citizens about 12:45 a. m. No fire department. Duration, about 1½ hours. stopped at Baker Brothers' store and Binger *Journal* office. Fire was favored by wood construction and close proximity of buildings. Private fire apparatus, pails and fire extinguishers. Persons in building, none. Means of escape, none. Value of buildings and contents, $70,000,. Property loss, $50,000.

March 16, 1917. Estill, Miss. Various buildings. Main street. General stores (2), church, school, etc. Ten 1- and 2-story build-

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Photo by Social Press Association, N. Y.

Fire on April 4 destroyed the 4-story building of the New York Lubricating Oil Company, 35 Water street, New York. Fire originated from lamp carried into basement by employe. Dense smoke from burning oils alarmed lower section of city. A man jumping from 3rd story window received fatal injuries.

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ings destroyed. Walls, wood and brick Floors, wood and concrete. Roofs, wood shingles and metal. Cause, defective chimney. Fire started in roof or attic of frame building. Discovered by blaze and smoke from roof about 12 midnight. No fire department. Duration, about 1 hour. Stopped within 100 yards of place of origin. Fire was favored by buildings too closely placed, and a high wind. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $75,000. Property loss, $50,000.

FERTILIZER AND ACID PLANTS

March 12, 1917. Nashville, Tenn. Tennessee Chemical Co. West Nashville, outside city limits. Manufacturing fertilizer. One 1-story building destroyed. Walls, wood and brick. Floors, wood. Roofs, composition. Cause, unknown. Fire started in acid chamber in north end of building. Discovered by night watchman about 9:28 p. m. Alarm, telephone and district box. Duration, two hours; confined to one building. Fire was favored by wood construction. As the fire was beyond city limits the department assisted the employes of the plant in using its private apparatus. Private fire apparatus, one 1,000-gallon and two 500-gallon electric-driven pumps and plenty of 2½-inch cotton hose. Persons in building, watchman only. Means of escape, 1-story building. Value of building and contents, $1,000,000. Property loss, $100,000.

FOUNDRIES AND MACHINE SHOPS

March 3, 1917. San Francisco, Cal. American Radiator Co. Second and Townsend streets. Manufacturing radiators. One 1½-story building gutted. Walls, brick. Floors, wood. Roofs, wood. Cause, spontaneous combustion. Discovered about 8:50 p. m. Alarm, street box. Duration, 3½ hours.

March 3, 1917. Columbus, Ohio. Bonney-Floyd Company. Marion road. Steel castings, car wheels, etc. One 1-story building damaged. Walls, frame. Floors, earth and wood. Roofs, wood. Cause, unknown. Fire started in boiler room. Discovered by workmen about 9 p. m. Stopped in boiler room. Fire was favored by frame construction. Persons in building, not reported to SAFETY ENGINEERING. Means of escape, 1-story building only. Property loss, $7,000.

GARAGES AND AUTO REPAIR SHOPS

March 6, 1917. Philadelphia, Pa. Logan garage. 5029-31 N. Broad street. Automobile repair shop. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, unknown. Fire started in 3rd story. Discovered by occupant about 3:52 p. m. Alarm, box. Duration, 1½ hours. Stopped at roof. Fire was favored by floors being saturated with grease and oils. Persons in building, not reported. Means of escape, stairway and windows only.

March 8, 1917. San Angelo, Tex. Concho Motor Sales Co. 218 S. Oak street. Automobile repairs. One 1-story building destroyed. Walls, corrugated iron. Floors, wood. Roofs, wood. Cause, explosion of gasoline. Fire started at rear end of building. Discovered by explosion about 10:30 a. m. Alarm, telephone. Duration, 2 hours. Stopped in building where it started. Fire was retarded by metal walls. Firemen handicapped by tardy alarm. Entire building was aflame when alarm was turned in. Private fire apparatus, garden hose used to protect neighboring dwellings. Persons in building, 6. Injured, 1, by explosion. Means of escape, doors. Value of building and contents, $12,000. Property loss, total.

GRAIN ELEVATORS

March 11, 1917. Kiowa, Kan. Mills elevator. South of Main street on Santa Fe Ry. right-of-way. Grain elevator. One building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started supposedly on ground floor. Discovered by train crews about 1:10 a. m. Alarm, telephone. Duration, about 3 hours. Stopped when building was entirely consumed. Fire was favored by wood construction. Firemen handicapped by weak pressure due to extreme length of hose in use. Persons in building, none. Means of escape, none. Value of building and contents, $4,500. Property loss, total.

March 11, 1917. Wimbledon, N. D. Farmers' Elevator. Soo R. R. right-of-way. General grain dealing. Elevator and office building destroyed. Walls, wood. Floors, wood. Roofs, shingles. Cause, unknown. Fire started on working floor. Discovered by railroad flagman about 5:30 a. m. Alarm, telephone and bell. Duration, under control in 2½ hours. Fire was favored by wood construction. Persons in building, none. Means of escape, none. Value of buildings and contents, $28,000. Property loss, total. The fire had burst through the cupola when fire department arrived which directed its efforts toward saving lumber yard and sheds adjoining.

March 16, 1917. Triumph, Minn. Farmers' Co-operative Elevator. C. & N. W. right-of-way. Dealing in grain. Three 1-story buildings destroyed; 2 elevators and a flour house. Walls, wood. Floors, wood. Roofs, shingles. Cause, unknown. Fire started in office. Discovered by smoke coming through elevator about 8:30 a. m. Duration, practically all day. Stopped when buildings were consumed. Fire was favored by all pine construction. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Property loss, $7,000.

HOTELS AND LODGING HOUSES

March 2, 1917. Gardner, Mass. Windsor House. Green and Pearl streets. Hotel. One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown; possibly defective wiring. Fire started in basement. Discovered by smoke in 2nd story about 5:50 p. m. Alarm, telephone.

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Duration, 13 hours before department went away. Stopped after roof had fallen in. Fire was favored by absence of any fire stops. Firemen handicapped by insufficient water supply. Persons in building, unknown. Means of escape, fire escapes and ropes. Value of building and contents, $53,000. Property loss, $15,000.

March 5, 1917. Deposit, N. Y. Loomis House. Front and Allen streets. Hotel. One 2-story building destroyed. Walls, brick veneered. Floors, wood. Roofs, tin. Cause, unknown. Fire started in basement. Discovered by smoke issuing from all parts of building about 1:45 a. m. Alarm, engine whistles and bells. Duration, 2 hours. Stopped when building was consumed. Persons in building, 21. Means of escape, 2 outside fire escapes. Value of building and contents, $40,000. Property loss, total.

March 6, 1917. Hope, B. C. Coauahulla Hotel. Wallace street and 1st avenue. Three 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in office. Discovered by firemen on C. N. railway about 3:30 a. m. Alarm, messenger. Duration, 1½ hours. Fire was favored by all wood construction. Firemen handicapped by having no water. Persons in building, 26. Killed, 6. Injured, 2. Means of escape, fire escapes. Value of buildings and contents, $30,000. Property loss, $20,000.

March 13, 1917. Los Angeles, Cal. Occidental Hotel. 427-37 S. Broadway. Hotel and stores. Two 3-story buildings partially destroyed. Walls, brick and frame. Floors, wood. Roofs, wood. Cause, explosion of gasoline. Fire started in basement of 429 S. Broadway. Discovered by explosion about 8:19 a. m. Alarm, telephone and boxes. Duration, about 3 hours. Stopped after going through all partitions and floors. Fire was favored by inflammable construction; "a great fire-trap, long dreaded." Firemen handicapped by much work in chopping floors and partitions in order to reach all of the fire. Private fire apparatus, hose lines. Persons in buildings, about 300. Injured, 12 firemen slightly hurt; also 1 other person. Means of

Fire burned 5 months in coal stored by George Hall Coal Company, Ogdensburg, N. Y. Cause, spontaneous combustion. Large trestle used to convey coal from boats to ground also destroyed. About 85,000 tons involved in fire. Loss, $45,000.

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Photo by Social Press Association, N. Y.

The greatest fire in the city's history swept 4 blocks of Asbury Park, N. J., on April 5. Forty-eight buildings, including hotels, boarding houses and residences, the First Methodist Church and a part of the "boardwalk" were destroyed. Loss, $1,000,000. Practically all the buildings were of frame construction with shingle roofs. This picture shows the Natatorium bathhouse where the fire started, and a section of the boardwalk.

Photo by Social Press Association, N. Y.

Conflagration of April 5 at Asbury Park, N. J. Ruins of Carlton Hotel. Supposed to be fireproof.

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Photo by Social Press Association, N. Y.

Conflagration of April 5 at Asbury Park, N. J. A view of the ruins looking toward the ocean. Dynamite was used in a vain effort to check the spread of the flames. A 50-mile gale was blowing at time of the fire.

Photo by Social Press Association, N. Y.

Conflagration of April 5 as Asbury Park, N. J. Another view of the ruins of the fireproof Carlton Hotel. Ten safes found in ruins of the fire revealed, in every instance, contents either destroyed or seriously damaged. In most cases the records were reduced to ashes or tinder. The interior cabinet work was charred or burned away.

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Photo by Social Press Association, N. Y.

Conflagration at Far Rockaway, L. I., N. Y., November 10, 1916. Fire started in 3-story frame storehouse of Mullen & Buckley, and spread to 7-story concrete building owned by the company. Seven buildings, including a hotel and several stores, and 14 horses were burned. Loss, $250,000.

escape, ample. Property loss, $78,200.

March 15, 1917. Los Angeles, Cal. Hotel Rosslyn. 431-47 S. Main street. Hotel and stores. One 6-story building seriously damaged. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started in seed store at 439 S. Main street about 2:55 a. m. Alarm, telephone, followed by 2nd, 3rd and 4th alarms. Duration, about 3 hours. Ran up through air shafts and through the floors. Fire was favored by absence of fire stops in floors and partitions. Firemen handicapped by difficulty in getting at the fire; obliged to use axes. Private fire apparatus, house lines of hose. Persons in building, about 400. Injured, 5 firemen slightly hurt. Means of escape, stairs, fire escapes and new building. Property loss, $44,000.

March 19, 1917, Poughkeepsie, N. Y., Morgan House. Main and Catharine streets. Hotel. One 4-story building destroyed. Walls, brick. Floors, wood. Roofs, tin and tar paper, Cause, unknown (under investigation). Fire started in basement. Discovered by bellboy about 1 a. m. Alarm, box. Duration, 14½ hours. Stopped when building was consumed. Fire was favored by light walls and wood floors. Firemen handicapped by high wind. Private fire apparatus, extinguishers. Persons in building, 87. Injured, 3 firemen. Means of escape, steel fire escapes, ropes at all windows. Value of building and contents, approximately $200,000. Property loss, total.

INSTITUTIONAL BUILDINGS

March 18, 1917. Riverside, Ill. Scottish People's Home. Desplaines avenue and 28th street. Charity home. One 1- and 2-story building destroyed. Walls, brick and fire tile. Floors, wood. Roofs, gravel. Cause, uncertain; supposed defective furnace. Fire started in furnace room. Discovered by barking of dogs about 2:15 a. m. Alarm, telephone. Duration, 5 hours. Stopped after building was consumed. Fire was favored by non-fireproof construction. Firemen handicapped by absence of water mains. Private fire apparatus, compressed air in basement. Persons in building, 39. Killed, 4. Means of escape, iron rods on sides of walls. Value of building and contents, $35,000. Property loss, total.

MANUFACTORIES, MISCELLANEOUS

March 2, 1917. Peoria, Ill. Peoria Cordage Company, 1502-14 S. Washington street. Manufacturing binder twine, rope, etc. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, spark from motor caught in sisal heap. Fire started in rear of 2nd story. Discovered by employe about 9:40 a. m. Alarm, box. Duration, 5 hours. Stopped in same building. Persons in building, 450. Killed, 1. Injured, 4. Means of escape, fire escapes front and rear. Property loss, $40,000.

March 9, 1917. Seattle, Wash. Carman Manufacturing Co. Massachusetts street and Railroad avenue, S. Mattress and furniture

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factory. One 3-story building damaged. Walls, wood. Floors, wood. Roofs, wood. Cause, excelsior picker; metal in excelsior or hot bearing. Fire started in or under picker. Discovered by employe about 2 a. m. Alarm, auxiliary box to city alarm box. Duration, 15 or 20 minutes; smoldered for an hour longer. Did not spread more than 30 feet in any direction. Fire was favored by large open areas on all floors; no fire stops of any kind. Firemen handicapped by distance of auxiliary box from city box. Assistant chief and one company coming from opposite directions could not locate the fire. Private fire apparatus, sprinkler system, standpipes, hose and extinguishers. Persons in building, not reported. Injured, 4 firemen overcome by smoke. Means of escape, stairways and fire escapes. Value of building and contents, $160,00. Property loss, $20,000.

Photo by Social Press Association, N. Y.

Conflagration at Far Rockaway, L. I., N. Y., November 10, 1916. Fire passed through a hole in the wall of a storage building of Mullen & Buckley. Fourteen horses were burned to death in a barn belonging to the firm. Occupants of dwellings, blocks away from the fire, extinguished the blazing brands which dropped on their roofs.

MERCANTILES, MISCELLANEOUS

Feb. 23, 1917. Peabody, Mass. F. M. Horgan, Lake street, West Peabody. Retail ice dealer. Two 1-story buildings destroyed. Walls, wood frames. Floors, earth. Roofs, wood covered with tar paper. Cause, sparks from Boston & Maine R. R. train. Fire started on roof. Discovered by workman on roof about 1:15 p. m. Alarm, street box. Duration, 2 hours. Stopped 6 or 7 feet from the ground. Fire was favored by wood construction—old and dry. Firemen handicapped by no road leading to burning buildings; laid 2,000 feet of hose across the lake. Persons in building, none; 2 on the roof. Means of escape, 1-story buildings. Value of buildings and contents, $10,000. Property loss, total.

March 10, 1917. Wheeling, W. Va. Ohio Valley Drug Company. 1412-14 Main street. Wholesale drugs. One 4-story building destroyed. Walls, brick. Floors, wood, joisted. Roofs, tar paper. Cause, unknown. Fire started in 2nd story. Discovered by policeman about 2:20 a. m. Alarm, street box. Duration, 5 hours. Stopped within walls of building. Fire was favored by wood interior, open elevator shaft and no division walls Company also carried large amount of explosive chemicals. Firemen handicapped by fire shutters, high tension wires in front and rear, and fumes from chemicals. Private fire apparatus, extinguishers on all floors. Persons in building, none. Injured, several firemen cut and bruised by falling walls. Means of escape, none. Value of building

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Photo by Social Press Association, N. Y.

Fire at Far Rockaway, N. Y., November 10, 1916. Part of the concrete storehouse belonging to Mullen & Buckley; after the fire.

Photo by Social Press Association, N. Y.

Interior of Mullen & Buckley's storehouse, Far Rockaway, L. I., N. Y., after the fire on November 10, 1916. Rooms were filled with furniture stored by summer residents. Many automobiles were in the buildings, and gasoline explosions helped to spread the fire.

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and contents $130,000. Property loss, $120,000.

This was a spectacular fire because of many explosives carried in stock. There were about 20 explosions, the largest of which caused the rear wall to fall, scattering the burning embers for blocks. A number of roofs caught from these brands, but were extinguished with chemicals before gaining much headway. The fire jumped a 10-foot alley and started in an easterly direction. It also started north on an adjoining roof, but was stopped before any serious damage was done. The rear wall in falling went through a 1-story garage, ruining two automobiles valued at $2,500.

March 11, 1917. High Shoals, Ga. Postoffice and business buildings. One 2-story, five 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood (1 metal roof). Cause, unknown. Fire started in vacant building adjoining postoffice. Discovered about 2:30 a. m. No fire department. Duration, about 2 hours. Stopped when buildings were consumed. Fire was favored by flimsy wood construction. Persons in building, not reported. Value of buildings and contents, $6,000. Property loss, total.

March 23, 1917. Philadelphia, Pa. Philadelphia Excelsior Co. 976-80 N. Beach street. Dealers in excelsior. One 1-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tin. Cause, uncertain. Discovered by employes about 11:56 a. m. Alarm, fire alarm telegraph. Duration, about 7 hours. Stopped at ground floor. Fire was favored by open space and absence of fire stops. Persons in building, not known. Means of escape, doorway.

METAL WORKERS

March 3, 1917. Tipton, Ind. Henri Clauss. Mill and Armstrong streets. Manufacturing cutlery. One 1- and 4-story building destroyed. Walls, brick, steel window sash. Floors, wood. Roofs, gravel, tar and paper. Cause, defective electric control on elevator. Fire started in loft above elevator. Discovered when it broke through the roof about 11 p. m. Alarm, telephone. Duration, 12 hours. Stopped in basement. Firemen handicapped by the breaking of high-pressure gas pipe inside building. Persons in building, none. Means of escape, ample fire escapes. Value of building and contents, $145,000. Property loss, $130,000.

MISCELLANEOUS

Feb. 27, 1917. Chicago, Ill. Columbia Distilling Company. 18-20 W. Kinzie street. Manufacturing cabinets and cedar mops. One 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood, gravel covering. Cause, unknown. Fire started in 4th story. Discovered by citizen about 3:45 a. m. Alarm, register from signal box. Duration, 2 hours. Fire was confined to 2 upper floors. Fire was favored by ordinary wood construction. Persons in building, none. Means of escape, wooden stairway and 2 fire escapes. Value of building and contents, $26,000. Fully insured.

March 1, 1917. Oshawa, Ont. Oshawa Interior Fittings Co. Albert and Athold streets. Manufacturer of interior fittings. One 1-story and one 3-story building destroyed. Walls, brick. Floors, wood and cement. Roofs, wood, gravel covering. Cause, unknown. Fire started probably about the center of main building. Discovered by watchman about 5:35 a. m. Alarm, telephone. Duration, about 12 hours. Stopped when buildings were consumed. Fire was favored by light wood floors, no fire walls. Firemen handicapped by break in standpipe inside building. No outside shutoff. Private fire apparatus, hose attached to standpipe in building. Persons in building, 1. Means of escape, no fire escapes. Value of buildings and contents, $69,764.

March 3, 1917. South Bend, Ind. Studebaker Corporation of America. 545 S. Scott street. Automobile assembling. One building destroyed, 6 damaged; all 1 and 2 stories. Walls, frame. Floors, wood. Roofs, wood, tar and gravel. Cause, overheated electric motor. Fire started in rear portion of building. Discovered by employe about 12:30 p. m. Alarm, telephone. Duration, under control in 1½ hours. Stopped in same building where it originated. Fire was favored by wood construction. Firemen handicapped by a frozen hydrant. Persons in building, 2. Means of escape, ample. Value of buildings and contents, $38,000. Property loss, $35,000.

March 5, 1917. West Union, Minn. Creamery. Oak street. Buttermaking. One 1-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, overheated furnace. Fire started in walls of building. Discovered by seeing smoke about 9:30 a. m. Alarm, ringing fire-bell. Duration, 30 minutes. Stopped when building was consumed. Fire was favored by dry wood construction and brisk wind. Firemen handicapped by tardy alarm. Persons in building, 300. Means of escape, 4 doors. Value of building and contents, $5,000 to $6,000.

March 7, 1917. Chippewa Falls, Wis., Chippewa Falls Bottling Works. Park avenue. Two 2-story buildings destroyed. Walls, frame. Floors, wood. Roofs, shingles. Cause, defective stove. Fire started in office. Discovered by passerby about 10:15 p. m. Alarm, telephone. Duration, 1 hour, 30 minutes. Stopped when buildings were consumed. Fire was favored by flimsy wood construction. No fire protection and no hydrants within half a mile. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $12,000. Property loss, total.

March 23, 1917. Hazleton, Pa. Jeansville Iron Works. Poplar and Buttonwood streets. Manufacturing war munitions. One 2- and 3-story building partially destroyed. Walls, brick and cement. Floors, cement. Roofs, iron trusses, board roof with slag. Cause, rosin tank boiled over. Fire started on ground floor about the center of building. Discovered by employes about 1:05 p. m. Alarm, box. Duration, 4 hours. Stopped in building where it started. Fire was easy to fight on

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account of wall and other openings. Private fire apparatus, chemical system and an electrical pump which started automatically when plug was turned on. Persons in building, about 900. Killed, 1. Injured, 6 slightly hurt. Means of escape, ample exits. Value of building and contents, $255,000. Property loss, $5,000.

OFFICE BUILDINGS

March 7, 1917. Lakewood, N. J. Office building. Clifton avenue and Main street. Printing office, real estate, doctors', lawyers' and dentists' offices. One 3-story building destroyed. Walls, North Carolina pine. Floors, wood. Roofs, slate. Cause, unknown. Fire started in 2nd story in rear. Discovered by passersby about 1:05 p. m. Alarm, box, Gamewell system. Duration, about 4½ hours. Stopped in building where it started. Fire was favored by all wood construction, both exterior and interior. Persons in building, 11. Means of escape, none. Value of building and contents, $36,000. Property loss, $7,000.

March 11, 1917. Council Bluffs, Iowa. Commercial National Bank building and others. Broadway and Scott street. Bank, 10-cent store, cigar store, offices and rooming house. Three 3-story, and one 4-story building damaged. Walls, brick. Floors, wood. Roofs, gravel and tin. Cause, unknown. Fire started in basement of corner building. Discovered by newspaper carrier about 3:20 a. m. Alarm, telephone. Duration, 10 hours. Stopped at east building (cigar store). Fire was favored by large openings in the basement walls of all the damaged buildings, allowing fire to spread from one building to the next. Firemen handicapped by lack of pumping engines and inadequate fire-fighting force. Omaha department called upon for assistance. Persons in building, 1. Means of escape, fire escapes on all buildings. Value of buildings and contents, $142,000. Property loss, $20,500.

March 20, 1917. Necedah, Wis. L. G. Williams & Co. Main street. Offices and pool room. One 2-story building destroyed. Walls, wood and steel. Floors, hardwood. Roofs, tar paper. Cause, unknown. Discovered at railway station about 3 a. m. Alarm, telephone. Duration, about 2 hours. No fire department. Stopped in same building where it started. Persons in building, none. Means of escape, none. Value of building and contents, $5,000. Property loss, $3,000.

ORE REDUCTION MILLS

Feb. 27, 1917. Moyle, B. C. St. Eugene mine. Concentrating mill. One 2-story building destroyed. Walls, wood. Floors, wood and earth. Cause, unknown. Discovered by fireman about 8 p. m. Usual alarm. Duration, 12 hours. Fire was favored by wood construction. Firemen handicapped by lack of water. Persons in building, 1. Means of escape, not reported to SAFETY ENGINEERING.

PUBLIC BUILDINGS

March 19, 1917. Gloucester, Mass. Police headquarters. Duncan and Rogers streets. Police station and old armory. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, wood and slate. Cause, probably rats and matches. Fire started in 3rd story. Discovered by passerby about 2:24 p. m. Alarm, regular system. Duration, 2 hours. Stopped at roof. Persons in building, about 20. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $75,500. Property loss, $21,000.

RAILROAD PROPERTY

March 3, 1917. Decatur, Ind. Several freight cars and contents. Pleasant Mills, six miles east of Decatur. Cars contained all kinds of merchandise. Cause, spreading rails piled up about 14 cars. Fire started in carload of matches about 4:30 p. m. Firemen handicapped by delay in reaching the place and lack of water; chemicals were the only means of fighting the fire. Property loss estimated at $100,000.

SCHOOLS AND COLLEGES

March 22, 1917. Nashua, N. H. Spring street, grammar school. Center of city. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, slate. Cause, unknown. Fire started in southeast corner of 2nd story. Discovered by watchman at nearby shop about 2:30 a. m. Alarm, box. Duration, 3 hours. Stopped in building where it started. Fire was retarded by brick partition walls. Persons in building, none. Means of escape, outside fire escapes. Value of building and contents, $115,000.

SLAUGHTER AND PACKING HOUSES

March 6, 1917. Tacoma, Wash. Carstens plant. One 4-story building destroyed. Packing Company. Tide flats. Meat packing Walls, wood. Floors, 2 floors concrete, others wood. Roofs, tar and gravel. Cause, unknown. Fire started in main building. Discovered about 11:50 p. m., March 5. Alarm, telephone. Duration, 1½ hours; confined to main building. Fire was favored by wood walls and partitions. Firemen handicapped by difficulty in reaching fire. Persons in building, none. Means of escape, outside stairway. Property loss, $50,000.

STABLES

March 6, 1917. De Kalb, Ill. J. Cook—stable. 221 Linden place. Livery and drayage. Two 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, tar paper. Cause, unknown. Discovered by passerby about 3:20 a. m. Building was all aflame. Alarm, telephone and box alarm. Duration, 3 hours. Stopped in carriage shed. Fire was favored by flimsy wood construction. Persons in building, none. Means of escape, doors on all sides of building. Value of buildings and contents, $15,000. Property loss, $12,000.

WAREHOUSES, PUBLIC STORES

March 2, 1917. East Cambridge, Mass. Morey & Co. 27 Commercial avenue. Paper warehouse; building in course of construction.

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One 5-story building partially destroyed. Walls, reinforced concrete. Floors, mill finish, hard pine. Roofs, wood, tar paper. Cause, supposedly spark from small fire used by employes. Fire started in 1st story. Discovered by employe about 2:50 p. m. Alarm, street box. Duration, about 6 hours. Stopped after going through roof. Fire was retarded by mill construction; interior finish of hard pine. Persons in building, 150. Means of escape, stairways. Value of building and contents, $98,000. Property loss $47,000.

WOODWORKERS

March 1, 1917. West Somerville, Mass. F. H. Newton Company. 80-90 Elmwood street. Manufacturing doors, sashes, blinds. One 1- and one 2-story building partially destroyed. Walls, wood. Floors, wood. Roofs, tar and gravel. Cause, probably careless smoker. Fire started in carpenter shop. Discovered by citizen about 6:40 p. m. Alarm, street box. Duration, 2 hours. Stopped in storage building adjoining office building. Fire was favored by wood construction. Persons in building, none. Means of escape, none. Value of buildings and contents, $75,000. Property loss, $20,000.

KILLED AND INJURED IN FIRES

Feb. 14. Girardville, Pa. Eighteen business buildings. Two persons injured.

March 2. Peoria, Ill. Peoria Cordage Co. One person killed; 4 injured.

March 4. Lansing, Mich. Dwelling of Wilber Van Epps. Three lives lost; 1 person injured.

March 6. Hope, B. C. Coauahulla Hotel. Six lives lost; 2 persons injured.

March 8. San Angelo, Tex. Concho Motor Sales Co. One person injured by explosion.

March 9. Seattle, Wash. Carman Manufacturing Co. Four firemen overcome by smoke.

March 10. Aurora, Ill. Swedish Lutheran Church. Three firemen injured.

March 10. Wheeling, W. Va. Ohio Valley Drug Co. Several firemen cut and bruised by falling walls.

March 13. Los Angeles, Cal. Occidental Hotel. Twelve firemen slightly injured; one other person injured.

March 15. Los Angeles, Cal. Hotel Rosslyn. Five firemen slightly injured.

March 18. Riverside, Ill. Scottish People's Home (charitable institution). Four lives lost.

March 19. Poughkeepsie, N. Y. Morgan House. Three firemen injured.

March 23. Brockton, Mass. Dwelling of G. C. Reynolds. Two occupants burned to death.

March 23. Hazleton, Pa. Jeansville Iron Works (Manufacturing war munitions). One life lost; 6 persons slightly injured.

Cleaning Up the Nation

LETTERS were written by the National Board of Fire Underwriters to the governors and fire marshals of the different States, and to the mayors, fire chiefs, health officers and chambers of commerce in leading American cities, urging that the first week in May be designated and generally observed as a spring "Clean-Up Week" annually.

This year is a time of national crisis when every effort to reduce public hazard becomes a patriotic duty. Such efforts, however, pay large dividends under normal conditions. In Cincinnati, prior to the first clean-up campaign, three years ago, the fire loss was $1,340,000. This was reduced to $370,537 in 1915 and approximately the same sum in 1916. Similarly, Decatur, Illinois, reports a fire loss of $164,010 for 1915, before the institution of the local clean-up campaign, and of $63,457 for 1916. As a result of Decatur's effort, more than 150 merchants provided themselves with metal receptacles for the storage of waste paper and rubbish.

Spring is a time of peculiar fire menace because of the accumulated litter of the winter months. The Georgia Fire Prevention Society has published statistics showing that all of the conflagrations in Southern cities during the last 25 years have occurred between February 25 and May 3.

A word of special precaution is necessary in regard to the storing of waste paper. Following the suggestion of the Federal Government that persons should save waste paper as a means of meeting the serious shortage of paper stock, thousands of school children began to collect paper and store it in school basements, thereby creating a hazard. *Such storage should never be made in schools or dwellings.* It is well to remember that paper is less likely to burn if tightly folded and piled than when it is thrown into a loose heap. It should be disposed of as often as possible so that large quantities may not accumulate. This is another case where individual carelessness causes the greatest fire hazard.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

WIRE GLASS FOR SAFETY

The Mississippi Wire Glass Company, 222 Fifth Avenue, New York, the largest manufacturer of wire glass in this country, invites industrial safety officials, fire preventionists and others who are engaged in the protection of life and property to submit any problems with which they are confronted in safeguarding buildings against the spread of fire. This company supplies wire glass for all requirements and the need for wire glass is often indicated in industrial buildings. To many men, the installation of wire glass windows does not occur, but to the trained fire preventionist, it is a matter of vast importance. Millions of dollars' worth of property and, undoubtedly, a great number of lives have been saved through the fire arresting qualities of wire glass windows. And, on the other hand, an enormous amount of property and a great number of lives have been sacrificed through fire spread, due, to a great extent, to lack of wire glass windows. The progressive industrial safety official, who is striving to surround the workers and the building with the safest conditions against accident and fire destruction, pays strict attention to the installation of wire glass. Not only does this protect but it acts as a powerful barrier against fire spread in case of fire, as was demonstrated in factories adjacent to the Black Tom explosion. It possesses great strength against sudden and violent shock and remains intact where ordinary glass splinters.

REMOVING THE HANDLING HAZARD

The Oxweld Acetylene Company, Newark, New Jersey, the well known manufacturer of welding and cutting equipments, calls attention to the hazard to which industrial workers are exposed in the handling of heavy castings. This is necessary where the castings must be removed to be sawed. If this method is employed, by the use of Oxweld Blow Pipe for cutting sprues, gates and risers, the casting does not have to be removed as the tool can be taken to the casting. This entirely removes the operations of the crane, trucking, adjusting and sawing which eliminates the danger of injuring the workman in these various operations.

The Oxweld Blow Pipe is now in extensive use in steel mills, foundries, etc., and is rapidly displacing the older practice of the saw.

NEW EDISON-LA FRANCE SEARCHLIGHT

During the destruction of the Edison Phonograph Works by fire, December, 1914, difficulty was experienced in fire fighting and salvage work through lack of adequate smoke penetrating light. This handicap was brought to Mr. Edison's attention. The great inventor saw the necessity and after considerable time spent in experimental and development work, a new searchlight was produced. The American-La France Fire Engine Company, Incorporated, of Elmira, New York, the largest manufacturer of fire fighting equipment in the country, was selected to manufacture and market this new Edison invention.

Although designed, primarily, for fire department work, these searchlights are also valuable, especially in the present crisis for protective lighting of bridges, reservoirs, and public buildings, industrial plants, docks, etc. The principal features which command attention in this new searchlight, are the quantity and brilliancy of light produced from a self-contained, easily carried outfit; the powerful light weight storage battery, with steel jars, securely welded in all seams, rigidly constructed, requiring very little care and attention, and very low maintenance cost. This light is safe, efficient and economical.

The American-La France Fire Engine Company believes that all practical requirements have been successfully met in the Edison La-France Portable Searchlight.

EYE PROTECTION IN THE INDUSTRIES

Among industrial workers, the eye is, undoubtedly, more liable to injury than any other part of the body. Authorities on eye

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protection claim that almost all of the leading industries have use for goggles. The number of eyes which have been sacrificed in industries before the necessity for proper eye protection was realized, has been enormous. The eye is the most delicate organ in the body and is constructed upon so delicate and so marvelous a body, that very little, indeed, can be done to repair a damaged eye. It is something beyond human aid. A serious eye injury means, usually, the eye lost forever. This should be realized thoroughly by every industrial employer. Accidents which are far more spectacular, broken limbs, large flesh wounds, etc., are often not nearly as serious as a foreign body entering the eye, which is hardly noticed; therefore, it is highly important that employers and safety officials insist that all their men subjected to eye injury wear goggles. The rule on this practice should be understood and rigidly enforced. There are yet too many eyes lost through men disobeying rules and removing their goggles when they should be worn.

Several industrial plants discharge men who remove their goggles and subject their eyes to injury. It seems hard to understand why a workman will deliberately remove goggles provided for safe-guarding his eyes. But many men will do this unless the rule is rigidly enforced. Eye injuries are happening daily which should not happen and the employer who desires to reduce eye accidents in his plant, must do more than provide goggles for the men; he must insist that they wear them.

FIRE LOSS LARGELY PREVENTED

Merchant & Evans Company, Philadelphia, the well known manufacturer of tin roofings, calls attention to the fact that the fire loss in the United States is largely preventable.

The National Board of Fire Underwriters, after consultation with the National Convention of Insurance Commissioners and the Fire Marshals' Association of North America, in tabulating the five hundred thousand or more fires occurring in the United States, ascertained that the per capita fire loss of the United States is many times greater than that of most European countries, and found in 1915 the following alarming figures:

Strictly Preventable Fires..	$32,720,238	21.4%
Partly Preventable Fires..:	58,148,339	37.9%
Unknown, Largely Preventable	62,363,298	40.7%

The question of roofing, in considering how fires can be prevented, is an important one. A large number of buildings are burned through the spread of fire from adjacent burning buildings, sparks from which light upon surrounding roofs and when such roofs are of combustible material, especially wooden shingles, the fire is started. Realizing this roofing fire hazard, a number of cities have framed ordinances prohibiting the use of combustible roofings. Communities desiring to reduce their fire loss should given attention to the wood shingle hazard.

NATIONAL EXPOSITION OF SAFETY AND SANITATION

All those engaged or interested in modern methods for safe-guarding life and property in the industries, will have the best opportunity ever offered them to examine the many safeguards, materials and equipments now being successfully used in accident prevention and fire prevention campaigns.

The National Exposition of Safety and Sanitation will be held in the Grand Central Palace, New York, September 10-15, under the joint auspices of the American Museum of Safety and the National Safety Council. Industrial employers, safety officials, labor department officials, insurance engineers and inspectors will be well repaid this year by attending the National Safety Council Annual Congress, held in New York during the same week as the Exposition of Safety and Sanitation. Every one attending the Safety Congress and Safety Exposition will gather new and valuable safety knowledge.

Among those who have reserved space for this exposition are the following:

American Abrasive Metals Company.
American Issue Publishing Co.
American Lighting Company.
American Mason Safety Tread Co.
Chesebro-Whitman Company.
Clipper Belt Lacer Company.
Consolidated Gas Company.
Detroit Fuse & Manufacturing Co.
Draeger Oxygen Apparatus Co.
Edison Storage Battery Company.
Foamite Fire Extinguisher Company.
Fyr-Fyter Company.
F. A. Hardy & Company.
S. F. Hayward & Company.
Julius King Optical Company.
Invincible Manufacturing Company.
Joint Board of Sanitary Control.
Krantz Manufacturing Company.
Life Saving Devices Company.
McNutt Can Sales Company.
Merry Optical Company.
Metropolitan Electrical Manufacturing Co.
Metropolitan Engineering Co.
Multi-Metal Separating Screen Co.
New York Central Lines.
New York Edison Co.
Nicholas Power Company.
Norton Company.
Patent Scaffolding Company.
Prudential Insurance Company of America.
Safety Engineering.
Safety First Supply Company.
Shur-Loc Elevator Safety Co., Inc.
R. P. Smith & Sons Company.
Southern Railway.
Standard Pressed Steel Co.
Stonehouse Steel Sign Company.
Strong-Kennard & Nutt Company.
The Kny-Scheerer Corp.
Universal Safety Tread Company.
Westinghouse Electric & Manufacturing Co.
T. A. Willson & Company.
Woolf Laboratories, Inc.

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UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

ABNER JUNIOR ACETYLENE GENERATOR. Abner Mfg. Co., The, Mfr., Wapakoneta, O.

AUTOMATIC FIRE ALARM SYSTEMS. Aero Fire Alarm Co., Inc., Mfr., 26 Cortlandt street, New York, N. Y.

AUTOMATIC FIRE ALARM SYSTEMS. Western May-Oatway Fire Alarms, Inc., Mfr., 920-21 Investment Building, Los Angeles, Cal.

AUTOMATIC SWITCHES—CLOCK OPERATED TYPE. Electric Flasher Co., Mfr., 80 Fifth avenue, New York, N. Y.

BOXES—MANUAL FIRE ALARM. Electrical Industries Mfg. Co., Mfr., 328 W. 41st street, New York, N. Y.; Amer. Dist. Telegraph Co., Submitter.

BOXES—MANUAL FIRE ALARM. Fire Alarm Signal Co., 246 Summer street, Boston, Mass.

BOXES—COMBINED WATCH AND FIRE ALARM. Dominion Gresham Guarantee & Casualty Co., Mfr., 302 James street, Montreal, Que.

BOXES—COMBINED WATCH AND FIRE ALARM. Holtzer-Cabot Electric Co., Mfr., 115-35 Armory street, Roxbury, Boston, Mass.

BOXES—COMBINED WATCH AND FIRE ALARM. Potter Electric Signal Co., C. E., Mfr., 1135 Century Building, St. Louis, Mo.

BOXES—COMBINED WATCH AND FIRE ALARM. Western Electric Co., Mfr., Chicago, Ill.; Amer. Dist. Telegraph Co., Submitter.

"BURDETT" ACETYLENE AND OXYGEN REDUCING VALVES. Burdett Manufacturing Co., Submitter, St. John's court, at Fulton street, Chicago, Ill.

CENTRIFUGAL FIRE PUMPS, NATIONAL STANDARD TYPE. Allis-Chalmers Mfg. Co., The, Mfr., Milwaukee, Wis.

CHEMICAL EXTINGUISHER—TWO WHEELED, SINGLE 45 GALLON. Obenchain-Boyer Co., The, Mfr., Logansport, Ind.

CLASS B PREPARED ROOF COVERINGS. Johns-Manville Co., H. W., Mfr., Madison avenue and 41st street, New York, N. Y.

"FAULTLESS" SWEEPING COMPOUND. J. M. Radford Grocery Co., Submitter, Abilene, Tex.

FIRE DOOR RELEASE. American Fire Prevention Bureau, Inc., Mfr., 17 Madison avenue, New York, N. Y.

FLUE FITTINGS. United States Fire Prevention Co., Mfr., Factories at St. Louis, Mo., and Westbrook, Me.

"GLOBE MODEL 5," DRY PIPE VALVE. Globe Automatic Sprinkler Co., Mfr., 2019 Washington avenue, Philadelphia, Pa.

HOLLOW METAL, FIRE WINDOW FRAMES. Ruth, J. F., Mfr., 4299 Easton avenue, St. Louis, Mo.

HOLLOW METAL FIRE WINDOW FRAMES. Sykes Co., The, Mfr., 930 W. 19th place, Chicago, Ill.

INSIDE HAND-OPERATED DISCHARGE DEVICES. Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

INSIDE HAND-OPERATED DISCHARGE DEVICE. Shotwell Pump and Tank Co., Mfr., 21 N. Alabama street, Indianapolis, Ind.

INSIDE HAND-OPERATED DISCHARGE DEVICE. Western Oil Pump and Tank Co., Mfr., 2437 Kosciusko street, St. Louis, Mo.

INSIDE POWER-OPERATED DISCHARGE DEVICE. Allen Pressure System Co., Inc., Mfr., 1926 Broadway, New York City.

LIQUID FIRE RETARDING PAINT. United States Gutta Percha Paint Co., Mfr., Providence, R. I.

MAGNETOS. Manhattan Electrical Supply Co., Mfr., Jersey City, N. J.

MAGNETOS. Utica Fire Alarm Telegraph Co., Mfr., 106-08 Liberty street, Utica, N. Y.

OUTLET BUSHINGS. Utility Fittings Co., Submitter, 812 Walnut street, Philadelphia, Pa.

OUTSIDE HAND-OPERATED DISCHARGE DEVICE. Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

OUTSIDE HAND-OPERATED DISCHARGE DEVICE. Shotwell Pump and Tank Co., Mfr., 21 N. Alabama street, Indianapolis, Ind.

PORTABLE RECORDERS AND KEY STATIONS. Chicago Watchman's Clock Works, Mr., 58-60 Wabash avenue, Chicago, Ill.

PORTABLE RECORDERS AND KEY STATIONS. Eco Clock Co., Mfr., 236 Congress street, Boston, Mass.

PORTABLE RECORDERS AND KEY STATIONS. General Watchman's Time Detector Co., Mfr., 27 Pine street, New York City.

PORTABLE RECORDERS AND KEY STATIONS. Hardinge Bros., Mfr., 1770 Berteau avenue, Chicago, Ill.

PORTABLE RECORDERS AND KEY STATIONS. Hausburg, E. O., Mfr., 45 Malden Lane, New York City.

PORTABLE RECORDERS AND KEY STATIONS. Nanz Clock Co., Mfr., 178 Fulton street, New York City.

PORTABLE RECORDERS AND KEY STATIONS. Nanz, Inc., Chas. A., Mfr., So. Orange, N. J.

PORTABLE RECORDERS AND KEY STATIONS. Newman Clock Co., Mfr., 567 Washington Boulevard, Chicago, Ill.

PORTABLE RECORDERS AND KEY STATIONS. Newman Clock Co., Ltd., Mfr.; 2 White Chapel road. London, England.

PORTABLE RECORDERS AND KEY STATIONS. Newman-Murderloh Clock Co., Ltd., Mfr., 51 Victoria square, Montreal, Que.

PORTABLE RECORDERS AND KEY STATIONS. Rowe & Son, A. C., Submitter, 33 Reade street, New York City.

PORTABLE RECORDERS AND KEY STATIONS. Timekeeper Co., The, Mfr., Chicago, Ill.

SLIDING OR SWINGING, TIN CLAD, FIRE WALL DOOR. Offenkrantz & Mark, Mfr., 117 Belmont avenue, Newark, N. J.

SLIDING OR SWINGING, TIN CLAD, FIRE WALL DOOR. Richards, Glendon A., Mfr., Grand Rapids, Mich.

SPRINKLER SUPERVISORY DEVICES. American Dist. Telegraph Co., Submitter, New York, N. Y.

SPRINKLER SUPERVISORY DEVICES. Automatic Fire Protection Co., Mfr., 29 So. La Salle street, Chicago, Ill.

SPRINKLER SUPERVISORY DEVICES. Automatic Sprinkler Alarm Co., Mfr., 2018 Locust street, St. Louis, Mo.

SPRINKLER SUPERVISORY DEVICES. Potter Electric Signal Co., C. E., Mfr., 1135 Century Building, St. Louis, Mo.

STATIONARY RECORDERS. American Watchman's Time Detector Co., Mfr., E. 35th street and Perkins avenue, Cleveland, O.

STATIONARY RECORDERS. American Watchman's Time Detector Co., Mfr., 235 Broadway, New York City.

STATIONARY RECORDERS. Edwards & Co., Mfr., 140th and Exterior streets, New York City.

STATIONARY RECORDERS. Hamilton & Co., E. A., Mfr., 1054 Sibley street, Grand Rapids, Mich.

STATIONARY RECORDERS. Hausburg, E. O., Mfr., 45 Malden Lane, New York City.

STATIONARY RECORDERS. Jaynes Electric Co., The, Mfr., 806 Main street, Buffalo, N. Y.

STATIONARY RECORDERS. Newman Clock Co., Mfr., 178 Fulton street, New York City.

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SAFETY ENGINEERING

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Atlanta Conflagration of May 21

Property Loss About $5,500,000—City's Vacillating Policy with Regard to a Roofing Ordinance Passed in 1916 to Take Effect in January, 1917; Changed, Later, to Become Effective July 1, 1917—After the Conflagration, Put into "Immediate Effect" on May 30 —Costly Procrastination

From a Special Report by the National Board of Fire Underwriters

ATLANTA has a population estimated at 196,000, a good percentage of which are negroes.

In the center of the city, on approximately the highest ground, is the mercantile district. Fire limits, in which frame construction and shingle roofs are prohibited, barely include this district, and in all other parts of the city, up to the edge of the congested value district, can be found frame buildings with wooden shingle roofs, in many cases in the poorest condition.

Along the railroads and in the borders of the mercantile and manufacturing section, the character of these frame buildings is cheap; they are mostly 1-story buildings, closely grouped, with practically no yard room. Rental of these buildings, which are occupied mainly by negroes, is low, and consequently repairs are seldom made. Throughout this area will be found shingles so old and in such poor condition that they are little more than punk; in addition they have curled up on the edges and usually there are innumerable cracks in which sparks can lodge.

The section where the fire started is of this character, and the first part of the area burned over is a continuation of the same construction. West of the burned area and extending up to and into the business district is an equally bad conflagration spreading district, and until conditions are changed by removing the now existing shingle roofs, there will be an ever-present danger of a far more serious conflagration.

In the report of the Committee on Fire Prevention of the National Board of Fire Underwriters made on the City of Atlanta in 1909, the statement is made that "In the shingle-roofed frame residential section there is always a high conflagration hazard," and again in 1914, the conclusion was drawn that "The frame residential sections, with shingle roofs, possess the hazard of flying brand fires to a pronounced degree." The South-Eastern Underwriters' Association has also emphasized this hazard and endeavored to have proper restrictive ordinances passed. The fire department records show a large percentage of fires

(*Continued on page* 351)

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National Fire Protection Association, 1917 Meeting

By Charles E. Worthington

LOUIS WIEDERHOLD, JR., the new president, is a native of Pittsburgh and of long insurance experience. He entered the business early and served with credit as special agent in the Pennsylvania field for the British America Assurance Company and later, for five years, as special agent of the German American in the same territory, leaving the last mentioned company in May, 1909, to assume the secretaryship of the Underwriters' Association of the Middle Department. It is needless to add that during these years Mr. Weiderhold has accumulated a large stock of respect, confidence and popularity and that his efforts in the matter of fire prevention have been intelligent and untiring. It is difficult to say whether the association or Mr. Wiederhold is most honored by the selection of the new president. SAFETY ENGINEERING is unable to introduce Mr. Wiederhold by his picture because of his extreme modesty in that respect.

D. EVERETT WAID, first vice president, is a well-known architect of New York City, whose special interest in better construction and fire prevention has borne much fruit. He began practice as an architect in Chicago in 1888 and removed to New York in 1898, where he has been since engaged as an architect in general practice and also in consulting practice for clients who make building loans. This work involves passing upon drawings and fixing specifications and requirements and following construction with his inspective force. He is a member of the American Institute of Architects and treasurer of the National Organization; also a member of the Architectural League, National Arts Club, Players Club, Greenwich Country Club and the City Club of New York.

H. O. LACOUNT, the second vice president, is engineer and assistant secretary of the inspection department of the Associated Factory Mutual Fire Insurance Companies. He is a graduate of the Massachusetts Institute of Technology in both electrical and mechanical engineering, and for 22 years past has been in the employ of the factory mutual insurance companies in the work of fire protection engineering. He has represented either the factory mutual laboratories or their inspection bureau (both active members) in the National Fire Protection Association since 1904 and during the past 13 years has served on many committees and as chairman of the committees on fire pumps and hydrants and valves. He has been a member of the executive committee for the past two years. He is a member of the Amer-

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ican Institute of Electrical Engineers, American Society of Mechanical Engineers, American Water Works Association and New England Water Works Association.

FRANKLIN H. WENTWORTH, secretary-treasurer, was first elected secretary in 1909 and set for himself the task of building a national organization that should rank with the leading organizations of the country. No one would deny that his object has been accomplished. The National Fire Protection Association list of organization members is the most distinguished of that of any voluntary association in the world. Mr. Wentworth became interested in the N. F. P. A. through his connection with the Underwriters' Laboratories whose branch office in Boston he established in 1905 after a year's travel in Europe. His first association with fire protection matters was in 1894 with Mr. W. H. Merrill, now president of the Underwriters' Laboratories, who in that year organized the Electrical Bureau of the National Board of Fire Underwriters. Mr. Wentworth was the field man of the bureau for five or six years. His previous business connection was with the Geneal Electric Company.

F. J. T. STEWART, chairman of the Executive Committee, has been superintendent of surveys of the New York Board of Fire Underwriters since October, 1909. He came to New York from Chicago in 1904 to take charge of the improved risk department of the Continental Insurance Company. In 1891 he received the degree of Bachelor of Arts from Georgetown University. Two years later he was graduated from Cornell University in electrical and mechanical engineering. Before entering the insurance business he served the Westinghouse Electric & Manufacturing Company in an engineering capacity. The Chicago Underwriters' Association made him superintendent of inspection in April, 1900. Mr. Stewart is a writer on the technology side of fire underwriting and is a man of pleasing personality.

First Day's Proceedings, May 8

Time, 10:15 a. m. Place, New Willard Hotel, Washington, D. C. A gavel falls impelled by the hand of Vice President Wiederhold. The buzz of conversation ceases, and everybody sits up and pays attention. The twenty-first annual meeting of the National Fire Protection Association has begun.

Calling of the roll develops a good representative attendance from a wide territory.

The president's address is postponed owing to the unavoidable absence of that gentleman.

EXECUTIVE COMMITTEE'S REPORT

The Executive Committee report

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deals first with the activities of the committee in approving for promulgation new or revised standards covering Automobile Fire Apparatus, Hydrants and Valves, Installation of Automatic Sprinklers in Railway Car Houses, Fire Resistive Construction, Manufacturing Risks and Special Hazards and Pipe and Pipe Fittings. The appointment of committees is noted on High Value Districts, Small Hose Couplings, Vestibule Fire Stops and Fire and Accident Prevention Day.

Sixteen committee reports are submitted for constructive criticism by the association. A reconsideration of the vote of the tenth annual meeting which conferred authority upon the Executive Committee ad interim to approve standards for promulgation with the concurrent approval of the Committee on Devices and Materials and the Special Committees is suggested, because the Committee on Devices and Materials no longer exists and the following substitute is offered:

RESOLVED, that the Executive Committee be given authority to approve for promulgation standards during the interval between annual meetings, provided that such subjects shall first be laid before any special committee appointed to deal with such matters. It is further understood that any such action by the Executive Committee shall be reported to the next annual meeting of the association.

The Executive Committee, at its June meeting, 1916, appointed a subcommittee of five on the Commercial Status of Sprinkler Installation. This committee has held several conferences with the representatives of the sprinkler installation companies on the subjects of fair competition in price, on maintenance of standards of installation in competition, on raising the quality of installation of sprinkler work in public buildings and other matters of mutual interest. The committee has had the most satisfactory and helpful co-operation of the sprinkler companies, and will report further.

Interest in the chemical fire hazard with particular reference to such industries as the manufacture of dyes, explosives and munitions has steadily increased during the year and, in addition to the discussion on munitions scheduled for this meeting, the Executive Committee recommends that arrangements be made to advance the study of the chemical fire hazards incident to dye and explosive industries. The Executive Committee's report was accepted as offered.

MEMBERSHIP AND EDUCATIONAL ACTIVITIES

The report of the secretary and editor followed, congratulating the association upon the fact that notwithstanding the increase of annual dues from $5 to $6, and the loss in Canadian associate membership from enlistments, the total membership has increased, the active membership to 133, a gain of 6, the associate membership to 2,922, a gain of 382. Honorary members, 3. A reduction because of military service now faces the association and calls for special effort to insure safe passage through the present and prospective crises. The revenue for the past year exceeded that of prior years, enabling the issue of monthly news letters, which has proved a very useful and successful experiment, but the income is hardly sufficient as yet to provide for the fullest measure of usefulness.

The edition of "Field Practice" is exhausted but as yet no second edition has been undertaken. The total of all publications aggregated over 40,000 copies (exclusive of the news letter) a number considerably in excess of any previous year. This included 13,400 copies of the quarterly.

The executives, at their December meeting, authorized the secretary to proceed with the assembling of matter for a proposed "Firemen's Manual," to be issued as a companion volume to "Field Practice." The co-operation of the International Association of Fire Engineers in this work has been assured by the appointment of five of its most capable fire chief members as a committee to assist. It is designed to publish this jointly, each chapter to be presented to both associations for criticism and revision before publication.

Tabulated fire records were care-

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fully worked out and published during the year on two classes of properties (clothing factories and warehouses), and special attention is being paid to the subject of loss of life in fires upon which the statistics even of the Federal government are not very illuminative. The annual summary of statistics in properties having automatic sprinkler protection was published as usual in the closing number of the current volume of the Quarterly.

ADDRESS BY THE SECRETARY OF COMMERCE

Following the receipt of the secretary's report the routine was broken by the entrance of the Honorable William C. Redfield, Secretary of Commerce, who was at once escorted to the platform and introduced briefly by the vice president.

Mr. Redfield spoke briefly, bearing on Conservation as his main topic, with allusions to the fire waste and the inadequacy of our restriction laws as compared with those of European countries as a contributory cause. The objects and work of the association were commended, and the need of elimination of all waste, especially of food, emphasized.

As soon as the applause had subsided Powell Evans moved a vote of thanks to Secretary Redfield. The following resolution, introduced by Mr. Forster, was adopted unanimously without debate:

WHEREAS, the Nation is at war and at such a time requires the special service of all citizens and organizations equipped to render such special service; and,

WHEREAS, there are many engineering and commercial societies in the membership of the National Fire Protection Association, whose special field of efforts enables them to assist the Government at this time, therefore be it

RESOLVED, that we commend the patriotism and public spirit of such members as the National Board of Fire Underwriters, the American Institute of Architects, and others who have already offered or are already rendering special service to the Government and we urge all of our members who are capable of assisting in the mobilization of the resources of the Nation to review their special resources and stand ready to serve in any capacity in which they may be called.

Other resolutions (published in full in the May number of SAFETY ENGINEERING) advocated the adoption by municipalities of the Standard Building Code of the National Board of Fire Underwriters; the adoption by all States of minimum building requirements for the protection of State and county hospitals, asylums and similar institutions; the enactment by each State of the fire marshal law; the adoption of the association's suggested ordinance providing for the systematic inspection of all buildings by city fire marshals or local firemen; the enactment of ordinances similar to that of Cleveland, Ohio, fixing the cost of extinguishing preventable fires upon citizens disregarding fire prevention orders; the wider general use of the automatic sprinkler; a careful study of the technical surveys of cities made by the engineers of the National Board of Fire Underwriters; the adoption of the association's suggested laws and ordinances for State and municipal regulation of the transportation, storage and use of inflammable liquids and explosives; the universal adoption and use of the safety match; the education of children and the public generally in careful habits regarding the use of fire.

COMMITTEE ON PUBLIC INFORMATION

Thereupon patriotism became submerged by the need of pursuing the regular routine and Mr. Wentworth submitted the report of the Committee on Public Information.

The necessary volume of this valuable report is unfortunately a barrier to complete reproduction. It covered in some detail the effective and valuable work of the committee in inducing the holding of local fire prevention meetings and the distribution of appropriate literature in that connection from which the committee believes far reaching results may be anticipated.

The promotion of the teaching of fire prevention in the public schools was discussed and suggestions offered as to the best methods to be pursued, evidence of active work in this direc-

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tion being adduced by the publication and distribution of 20,000 copies of the "Syllabus" which has been largely distributed by various State officials.

A fire prevention lecture has been prepared by the committee at the request of the Bureau of Education of the Federal Government and placed in the hands of the director to be redrafted to suit the needs of various school grades and be distributed by the government with the Syllabus to all educational institutions, public or private, in the United States. Of the bulletins issued those upon the Storage of Bituminous Coal and Electric Pressing Irons were noted as having attracted special attention from the public and the press.

The newly established Actuarial Bureau of the National Board of Fire Underwriters was descriptively noticed as was also the service rendered by the Underwriters Laboratories in the production of the motion picture, "An Unbeliever Convinced." The report closed with an allusion to the cooperation undertaken with the "National Clean-Up and Paint-Up Bureau" and the fraternal relations established with the National Safety Council.

The remainder of the morning session was devoted to the consideration of several previously printed committee reports which were generally adopted without material change; that of the committee on "Field Practice" suffering most and being, in part, remanded.

FURTHER REPORTS AND ADDRESSES

The afternoon session opened with further work of this nature, the most notable being an exceptionally well digested and thoughtful report on the subject of "Private Fire Supplies from Public Mains" and that of the committee on "Standard Hose Couplings and Hydrant Fittings for Public Service." The last mentioned committee reported much progress and announced that the limit of its work had been reached as further action would necessarily be more centralized, and it recommended that the matter be now taken over by the National Board of Fire Underwriters. This report was accepted and the committee discharged with a unanimous vote of thanks in appreciation of "unusual service."

The "round table" discussion was opened by W. D. Milne, who presented a report on the "Hazards of Ammunition Manufacture, Storage and Transportation." This proved to be more of a lecture than a discussion, a very great disparity in the matter of accurate information upon the technical points involved being evident as between the speaker and the audience. The report comes very near to being an up-to-date monograph, involving much patient research and technical skill and will bear much study.

Short addresses followed by Dr. Patterson of the Department of Hygiene, Harrisburg; Hon. John Price Jackson, Commissioner of the Department of Labor and Industry, Harrisburg, upon "State Regulation of Ammunition, Storage and Manufacture" and Col. B. W. Dunn, Chief Inspector of the Bureau of Explosives, New York City, upon the "Transportation of Explosives." All of these were highly interesting and instructive, but devoted more to emphasizing and explaining known facts and conditions than to discussion of new points.

Roy Miller spoke concerning labor conditions and Commander Galbraith, U. S. N., spoke in relation to building construction practices in navy yards, the usual vote of thanks being given in all cases.

Second Days Proceedings, May 9

The association convened at the United States Bureau of Standards, thereby missing a brisk fire in the premises of the National Engraving Company, nearly opposite the New Willard, and an opportunity to see the Washington fire department in action.

The consideration of committee reports was proceeded with, the especial criticism being focused upon the re-

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port on "Automatic Sprinklers" and the special approval upon the report on "Standardization of Pipe and Pipe Fittings" which earned a special vote of thanks.

SAFETY TO LIFE

Then came the topic of chief interest, the report of the Committee on Safety to Life.

The report was voluminous, carefully worked out and well illustrated and was further explained by the aid of stereopticon slides.

The discussion was prolonged and covered the remainder of the session, the speaking being wholly appreciative of the work of the Committee and participated in by both members and visitors. Many speakers elicited applause, among them being Miss Frances Perkins, secretary of the Safety Committee of New York City, who spoke enlighteningly upon the question of panic and the best means of educating and controlling the uneducated and hysterical foreign workmen. The hour of adjournment found the discussion unfinished.

A lunch provided by the Junior Lunch Club of the Bureau of Standards followed, in the course of which a short address was made by Vice President Wiederhold, who was followed by Dr. S. W. Stratton, Director of the Bureau of Standards.

Dr. Stratton outlined the aims and methods of the bureau, paying special attention to the work in relation to fire prevention and testing of materials and apparatus and assured the members of the hearty co-operation of the bureau in all possible ways.

The lunch was followed by a tour of the various buildings and inspection of the testing apparatus and laboratories, after which the members and their wives (such as had them with them) were taken by automobiles on a general sight-seeing tour of the city.

The evening was devoted to a visit to Keith's theater, where, following the regular program, the motion picture, "An Unbeliever Convinced," was produced.

The picture is an admirable one, the localities and persons depicted in many cases being completely recognizable, and should prove of great educational value. Needless to say, the occasion was highly appreciated.

Third Day's Proceedings, May 10

The association convened at the New Willard Hotel. Discussion of the "Safety to Life" report was resumed, resulting in a final vote of general approval and remanding some portions for further study.

VARIOUS INTERESTING SUBJECTS

Some more reports were considered, then came an address by Clarence H. Blackall of Boston, an architect of large reputation in his special line of work upon "Some Legal Requirements for Planning Theaters for Safety."

As would be expected, Mr. Blackall's address was an instructive one, starting from the premise that building ordinances are subject to constant change and progress as new methods and materials present themselves and noting, in passing, that almost all progress has been made in practical defiance of existing laws. The address fully embodies the intelligent views of its distinguished author, with modest reference to the reforms he has been instrumental in effecting.

Mr. Blackall was followed by Major Raymond W. Pullman, who spoke chiefly of the need of consultation with the police before as well as after construction and the need of complete cooperation with them in inspection and enforcement of regulations relating to places of amusement.

Mr. R. S. Robbins, manager of Keith's (Washington) theater, gave some very practical views of the duties and responsibilities of theater managers, the practicality of which was corroborated by the visit to the theater he controls.

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Mr. French then spoke of theater-construction and protection, bringing out forcibly the neglect to intelligently profit by the disasters of 300 years, and discussing at length the value of protective curtains, methods of ventilation and automatic sprinklers.

President Meek appeared and delivered his address, and was presented with a handsome pin as a gift of the association in partial expression of its appreciation of his service, to which he responded in a characteristic manner.

In the course of his remarks President Meek urged an increase in the association's revenues. The only solution of the situation, he said, is through an enlarged membership. Membership work requires systematic and persistent effort. He recommended that the work undertaken by the membership committee be continued along more efficient lines and with the assistance of a competent person under the direction of the secretary. In other words, he advocated the creation of a real member-getting department.

Throughout the rest of the day the reception and discussion of committee reports was continued, the discussions being animated at times, some necessary speeding up tending to render them brisk.

Upon conclusion of the program the report of the Nominating Committee was received and the officers for 1917 elected as given on preceding pages. President Wiederhold was seized upon and escorted (or rushed) to the chair where he delivered a brief but thoroughly Wiederholdian speech amid much applause.

Then adjournment.

"The tumult and the shouting dies,
The Captains and the Kings depart."

The twenty-first annual meeting of the National Fire Protection Association is history.

The Association's Broadened Scope

The "Coming of Age" begins a new era in the history of the association which has come to the parting of the ways and chosen the path leading upward. Not so easy as the level road, but progress always requires effort and effort is born of enthusiasm and conviction.

In its inception, the association was wholly an insurance organization. It was born of necessity. Already the breaking away from old traditions had made progress and the advanced thought was directed to a reduction of fire loss by active work and intervention.

One need not hark back very far to the time when the popular idea of an insurance company was a get-rich-quick scheme and boards of underwriters were held to be associations organized solely to ascertain just how much the traffic would bear—and get it.

There was very little altruism in the original plan. The total absence of standards of apparatus hampered the progressive companies and exposed their patrons to almost unlimited imposition from apparatus dealers.

The factory mutuals had blazed the way for the advocates of fire protection and at the same time achieved such success in many ways that some plan of competition was demanded.

The old theory of the function of fire insurance companies was to put a price upon things as they were. Advocacy of better fire protection with lower rates and consequently reduced commissions was held to be a proposition of business suicide or worse.

As an illustration, not many years prior to 1896 a group of special agents appealed to the head of a rating organization, one of the leaders, for a reduced rate upon a newly constructed electric station of very superior construction and was answered: "The rate is blank per cent, which is as low as any electric station should be written; and the reason we do not rate the stations you quote (inferior frame converted buildings) higher is simply that we cannot do so and get

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any business out of them." A forcible reminder of the English judge who said, a man who would steal a sheep deserved hanging—and they could not find any worse punishment for murderers.

The change in the underwriting mind has been great, and it would be difficult to find at this time an adherent to the old idea, an outspoken opponent of fire protection or of insurance effort in that direction.

The association exemplifies the persistence of the new idea, and, more than that, the tendency of persistent ideas to accretion of allied ideas.

It is this that maintains enthusiasm. Insurance, in itself, has absolutely no interest in the preservation of life or safety to life except the minor consideration of the results of the diversion of fire department efforts in the early critical stages of a fire away from the fire to life saving.

The present ideals of the association are higher and the movement toward making a comprehensive public service association out of the organization is most encouraging in that it broadens the use and influence while in nowise impairing the original purpose, and this meeting appears to have made a tendency into an aim.

This entrance into a broader and more altruistic field ought to still more increase enthusiasm and persistence and, by adding a highly desirable new membership from a wider field, steadily enhance the usefulness of the organization.

One need only note the proportionate time given at this meeting to questions of conservation of life to realize the change and advancement.

Safety to Life in Factories

Editorial Note: Last year the National Fire Protection Association's Committee on Safety to Life submitted a preliminary report on the subject of limiting the number of occupants in a building in accordance with the stair capacity, but with due recognition of building construction, sprinkler protection, protection of vertical openings, height, and character of material manufactured, stored, or used. Since that time, the subject has been under almost constant consideration and discussion, not only by members of the committee, but also by others vitally interested in the subject of life safety in factories. While the committee takes a specific position on every phase of this problem, it felt it wise in its report to indicate alternative points of view.

TWO points of view that have been developed in the discussion of basing the number of persons upon the available exits are:

1. That (except a horizontal exit be provided) only so many persons should be allowed on each floor as can safely find refuge on the stairs and in their enclosures.

2. That the maximum emptying time be the determining factor and that with average and better class buildings, the number of persons allowed per floor be frankly in excess of the capacity of the stairs and the stair enclosures.

Your committee, after very careful consideration of the two points of view, has unanimously adopted the latter with the proviso, however, that for the poorer class of buildings and for the highly combustible occupancies, the requirements set forth in the first instance shall be met.

The committee has come to this decision because it seems fundamentally sound to assume that life is safer against fire in buildings where:

(a) Construction is slow burning or non-combustible rather than joisted.

(b) Sprinklers are provided.

(c) Vertical openings are partially or fully protected rather than open.

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(d) Buildings are low rather than high.

(e) Contents are of moderate or low, rather than of high inflammability.

How much safer life is because of better construction, protection, or occupancy conditions, is and probably always must remain, a matter of judgment. Your committee frankly states that, within the maximum emptying time limit set in the table, the adjustment of values has been a matter of judgment. The percentage allowances which have been made are as follows:

(a) For superior construction: 10% for high inflammability; 25% for moderate inflammability; 25% for low inflammability.

(b) For the provision of sprinklers: 50% for high inflammability; 75% for moderate inflammability; 100% for low inflammability.

(c) For protection of vertical openings: The normal condition is assumed to be that where the required exit stairs, inside or outside, are enclosed or protected. 50% penalty for open stairs (where permitted at all); 15% credit for protection of all vertical openings.

(d) For less inflammable occupancy: Average for tabulation to approach as closely as possible; 50% increase for moderate as against high inflammability; 100% increase for low as against high inflammability.

Note.—The desired ratio could not be maintained throughout the tabulation, because the allowances for superior construction and for sprinklers varied in each division. The average increase for the whole tabulation is approximately 40% more for moderate as against high, and approximately 80% more for the low as against high inflammability.

EMPTYING TIME

For the purpose of a tabulation of this character, it is necessary to establish an emptying time speed such as that of persons passing out of the front door of the building. In the opinion of the committee, based on information available to it, it is felt that this speed could safely be assumed to be 45 persons per minute per unit of stair width past a given point.

If the number of persons on each floor is just large enough comfortably to fill the stairs and halls, and if the method of emptying the building is first to get all persons into the stairs and halls, and then simultaneously to start marching them out of the building, the emptying time in seconds will be equal to the number of persons per unit of stair width located above the first floor multiplied by 60/45 or 4/3, plus a time allowance necessary to get the people from their working places on the floor into the halls and on the stairs. This allowance has been made 30 seconds in all cases. To bring this out clearly, the tabulation shows two figures under emptying time in seconds. The one, the time to empty the building after the persons reach and fill the stairs and stair enclosures, and the other the total emptying time, 30 seconds higher in each instance.

If, however, the number of persons is greater than the capacity of the stairs and stair enclosures, it is obvious that some persons will have to wait on some or all floors, while others pass down the stairs, before they can get into the stair enclosures. This situation, however, does not change the fact that it is proper to base emptying time calculations upon the number of persons per unit of stair width above the first floor.

The foregoing is on the assumption that the persons on the first floor will have separate exits or will move out without interfering with those coming down from above.

This 45 per minute rate of travel past a given point is believed to be conservative for buildings up to 7 stories in height as shown in tabulation. For higher buildings, there will be undoubtedly a slowing up of travel, making it necessary to cut down the per floor allowance per unit of stair width, except, of course, that it is never necessary to cut down this allowance below the safe capacity of the stairs and stair enclosures, if these have adequate fire-resisting power.

In making up the table, the emptying time limits have been approximately set at 3 minutes in high inflammability buildings, 4 minutes in moderate inflammability ones, and 5 minutes in low inflammability ones, in each case allowances as great as this applying only to the best types of building construction and protection.

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Line 72 in the tabulation shows maximum emptying times in the three classes of occupancy of 182, 238 and 302 seconds, respectively.

BASIS FOR TABULATION

The committee feels that, because of the variation in building heights, size of landings, and area of halls, it is advisable to determine by actual measurement in each case what the actual capacity of stairways is in accordance with the following scheme:

(a) One person per unit of stair width allowed for each two treads in the flight, running from the floor on which persons are located to the floor immediately below. The every other step rule is essential if persons are to move down stairs.

(b) One person in addition to be allowed for each 5 square feet of floor space on landings and in passageways in or between flights of stairs. This will allow from 2½ to 3 feet between persons in line.

To illustrate: a common story height for factories is 12 feet between floors, and such heights commonly have 18 treads per story. This will allow 9 people on the stairs proper. With loft buildings having a landing half way between stories and with minimum sized area occupied by stairs, the number of additional persons that could be placed on landings may not exceed two, making the total eleven persons per unit of stair width per flight of stairs. Where, however, stairs are unbroken between stories and are superimposed, the number of persons that the hall can hold may easily be as many as 7 per unit of stair width, making a total of 16 persons per flight. The average for American factories probably lies somewhere between these two limits.

It is obvious that one or more stairways of those provided in a building may be blocked in whole or in part by fire or smoke in the stairway, or by fire between persons and the means of exit. It has been advocated that the larger or largest stair in a building should be ignored altogether in fixing the occupancy, on the ground that this might not be available to persons seeking exits. Your committee, however, feels that a better basis of procedure, taking into account many different situations and simplicity of administration, would be to reduce the measured capacity of all the stairs in a building by one-third. If a building had 3 stairs, all of equal size, and one were entirely blocked, it would give the other 2 stairs their normal capacity.

The tabulation starts with the basis figure 10 in column 5 and line 9. The use of this figure 10 assumes that the stair in question has a capacity of 15 persons. This is a condition commonly found and the figure 10 is furthermore a desirable one for this tabulation because it permits all of the other figures in the table to be viewed as percentages of the basis. We believe the basis figure should appear in line 9, for the following reasons:

(a) A 4-story building is about the average factory height.

(b) Enclosure or protection of the exit stairs is fundamentally desirable.

DEVELOPMENT OF THE TABULATION

Starting with the basis figure of 10 as described in the preceding section and with the percentage allowances for superior construction, for sprinklers, and for stair enclosure, the committee proceeds to establish the fourth floor figures in each case, and for convenience these are shown throughout in bold-face type.

To illustrate: Follow down column 5. In line 9, the basis figure 10 appears. In line 15, there has been made an allowance of two persons (15 per cent) for the protection of all vertical openings.

In line 27, allowance of 50 per cent has been made as compared to line 9 because of sprinkler protection.

Similarly, line 33, containing the figure 18, has the allowance 50 per cent greater than figure 12 in line 15.

The only difference between the lower half and the upper half of the tabulation is an increase of 10 per cent for superior construction.

After the fourth floor figures in column 5 were fixed, those in columns 6 and 7 were established, having in mind the emptying time limits, and the

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proposed percentage relations of these columns of relative inflammability of contents.

After the establishment of the figure for the fourth story in each case, the other figures for floors 2, 3, 5, 6 and 7 were arbitrarily determined with the following principles in mind:

(a) That the maximum emptying time for the three divisions of inflammability should not exceed 3, 4, and 5 minutes respectively.

(b) That the number of persons per floor should decrease as the building increases in height, and that it should increase as the building is lowered.

(c) That the emptying time of the building should decrease as the height of the building is decreased.

A study of the table will show that in the high inflammability column the number of persons permitted per unit of stair width is very moderate, even in buildings of the finest type.

The moderate inflammability column represents average conditions, and a very large percentage of all factories will fall into this division. As stated previously, the average allowance per unit of stair width is approximately 40 per cent greater than for the high inflammability. Except with the very finest buildings, the emptying time does not exceed 3 minutes.

The low inflammability division, as stated previously, is on an average about 80 per cent higher than the high inflammability one. Here a building has to be exceedingly good before the emptying time is allowed to exceed 4 minutes.

OCCUPANCIES NOT PERMITTED IN SOME BUILDINGS

It will be observed that no figures are given in a number of divisions in the table. Wherever blanks have been left, it means that the committee recommends against permitting the presence of various occupancies in buildings higher than those for which figures are given. For example, in divisions A and G, no high inflammability occupancies may be placed in buildings with open stairs, which are not sprinklered, but moderately inflammable occupancies are allowed in 3-story, open stair, unsprinklered buildings, and low inflammability occupancies in 4-story buildings of this type.

LIMITING OF TABLE

The table has been limited to 7 stories for the following reasons:

(a) This height will take care of practically all factory buildings in the country, except higher loft buildings in a few of our large cities.

(b) The committee felt that the emptying speed upon which the table is based could not safely be assigned to buildings higher than 7 stories without more elaborate tests being made to ascertain the facts in the case.

FACTORS ON WHICH TABLE IS PREDICATED

The use of this table is predicated upon the following:

Joisted or quick burning construction is any form of construction in which the walls, columns, or floors are of lower fire-resisting power than mill construction.

Mill or slow burning construction buildings are required to have masonry walls, heavy timber or fireproof columns, wide spaced girders or floor timbers with minimum dimension of 6 inches, and solid wooden floors not less than 4 inches (nominally) thick.

Incombustible construction shall be that in which walls, columns, girders, floors, enclosures of vertical openings, and principal partitions are incombustible. Protection of steel with fire-resistive material is not essential from a life safety standpoint.

Sprinkler protection shall be complete, shall comply with the association's standards, and be systematically looked after and properly maintained.

The unit of measure of stair width shall be not less than 18 inches in existing buildings, and not less than 22 inches in buildings constructed in the future. No credit shall be allowed for a fraction of the unit widths.

The design of stairs in new buildings should accord with the Building Code of the National Board of Fire Underwriters.

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Proposed Capacity in Number of Persons Per Unit of Stair Width.

(Unit width 18 inches in existing and 22 inches in new buildings as measured between handrails)

Based on Emptying Time, and on Construction, Sprinkler Protection, Protection of Vertical Openings, Height, and Character of Materials, Stored, Manufactured or Used

Column 1	Column 2	Column 3	Column 4	Column 5		Column 6		Column 7		Column 8	Column 9
Type of Construction	Automatic Sprinkler Protection	Protection of Vertical Openings	Story Height of Building	Character of Material Stored, Manufactured or Used — High Inflammability		Moderate Inflammability		Low Inflammability		Line No.	Division
				Emptying Time in Secs.	Persons per Floor	Emptying Time in Secs.	Persons per Floor	Emptying Time in Secs.	Persons per Floor		
JOISTED OR QUICK BURNING CONSTRUCTION	NO	Open Stairs	2			42-12	9	46-16	12	1	A
			3			51-21	8	57-27	10	2	
			4					62-32	8	3	
			5							4	
			6							5	
			7							6	
		Stairs Enclosed or Protected	2	43-13	10	53-23	17	62-32	24	7	B
			3	56-26	10	70-40	15	83-53	20	8	
			4		10	82-52	13	94-64	16	9	
			5			94-64	12	110-80	15	10	
			6					116-86	13	11	
			7					126-96	12	12	
		All Vertical Openings Protected	2	46-16	12	57-27	20	67-37	28	13	C
			3	62-32	12	75-45	17	91-61	23	14	
			4	78-48	12	90-60	15	106-76	19	15	
			5			105-75	14	121-91	17	16	
			6			116-86	13	130-100	15	17	
			7					142-112	14	18	
	YES	Open Stairs	2	41-11	8	50-20	15	62-32	24	19	D
			3			64-34	13	83-53	20	20	
			4			78-48	12	94-64	16	21	
			5					105-75	14	22	
			6							23	
			7							24	
		Stairs Enclosed or Protected	2	50-20	15	70-40	30	94-64	48	25	E
			3	70-40	15	99-69	26	136-106	40	26	
			4	90-60	15	122-92	23	158-128	32	27	
			5	110-80	15	142-112	21	184-154	29	28	
			6			156-126	19	203-173	26	29	
			7			174-144	18	212-192	24	30	
		All Vertical Openings Protected	2	54-24	18	76-46	35	104-74	56	31	F
			3	78-48	18	110-80	30	152-122	46	32	
			4	102-72	18	134-104	26	178-148	37	33	
			5	121-91	17	158-128	24	206-176	33	34	
			6	143-113	17	176-146	22	230-200	30	35	
			7			198-168	21	246-216	27	36	
MILL OR SLOW BURNING CONSTRUCTION AND INCOMBUSTIBLE CONSTRUCTION.	NO	Open Stairs	2			45-15	11	50-20	15	37	G
			3			57-27	10	62-32	12	38	
			4					70-40	10	39	
			5							40	
			6							41	
			7							42	
		Stairs Enclosed or Protected	2	45-15	11	59-29	22	70-40	30	43	H
			3	59-29	11	80-50	19	96-66	25	44	
			4	74-44	11	94-64	16	110-80	20	45	
			5			110-80	15	126-96	18	46	
			6			123-93	14	143-113	17	47	
			7					150-120	15	48	
		All Vertical Openings Protected	2	47-17	13	63-33	25	76-46	35	49	I
			3	64-34	13	88-58	22	107-77	29	50	
			4	82-52	13	95-65	19	122-92	23	51	
			5	99-69	13	121-91	17	142-112	21	52	
			6			136-106	16	156-126	19	53	
			7			150-120	15	166-136	17	54	
	YES	Open Stairs	2	41-11	9	55-25	19	70-40	30	55	J
			3			75-45	17	96-66	25	56	
			4			86-56	14	110-80	20	57	
			5			99-69	13	126-96	18	58	
			6					136-106	16	59	
			7							60	
		Stairs Enclosed or Protected	2	53-23	17	80-50	38	111-81	61	61	K
			3	75-45	17	118-88	33	163-133	50	62	
			4	98-68	17	146-116	29	190-160	40	63	
			5	115-85	16	168-138	26	222-192	36	64	
			6	136-106	16	189-159	24	250-220	33	65	
			7			206-176	22	270-240	30	66	
		All Vertical Openings Protected	2	57-27	20	88-58	44	123-93	70	67	L
			3	83-53	20	131-101	38	184-154	58	68	
			4	110-80	20	162-132	33	214-184	48	69	
			5	131-101	19	190-160	30	254-224	42	70	
			6	156-126	19	216-186	28	283-253	38	71	
			7	182-152	19	238-208	26	302-272	34	72	

NOTE: Figures for a Building of a given Height are the Number of Persons Allowed on each Floor of that Building.

Safety to Life Committee, The National Fire Prevention Association, Boston, Mass.—Revised March 1917.

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In existing buildings, stairs, either inside or outside, shall not be considered adequate means of egress if the pitch is over 50 degrees, or if the tread is less than 8 inches.

Outside stairs built in accordance with the association's standard (solid platforms and risers and fully protected against fire in building) shall be entitled to two-thirds the credit of inside stairs.

Outside stairs not in accordance with the association's standard, but having pitch not greater than 50 degrees and stair treads not less than 8 inches wide, shall be entitled to one-third the credit of inside stairs, providing the stair continues to the ground or terminates in a swinging stair section.

Where outside stairs are protected against fire within the building, they shall be rated on the same basis as an enclosed stair, and where they are unprotected, on the open stair basis, the two-thirds or one-third allowance to apply in accordance with the preceding paragraphs.

Outside stairs terminating in drop ladders shall be entitled to no credit whatsoever.

The capacity of a stair is determined by its narrowest point, in so far as all persons above that point are concerned.

Handrails should be provided on both sides of stair over one unit wide.

Adequate light, both natural and artificial, is considered fundamentally necessary for stairs.

Two ways of egress must be provided from every building or section. One of these must be an inside stairway or smokeproof tower, and the other may be an inside stairway or a smokeproof tower, or a horizontal exit or an outside stairway.

Exits shall be so arranged with regard to floors that there are no pockets or dead ends of appreciable size in which persons might be trapped.

Doors giving access to means of egress must swing with the travel or slide across the travel, and there shall be no obstructions to stairs or on stairs or landings.

The committee, up to the present time, feels warranted only in recommending this tabulation for factory and for storage buildings used in connection with manufacturing plants. Further study may develop the fact that it can, with or without modification, be used for mercantile occupancies such as department stores, for schools, for places of public assembly, etc.

FACTORS BY WHICH TABULATION IS MODIFIED

In order to meet situations found in the field, the following modifying factors are submitted:

For each winding stair tread, reduce allowed capacity 5 per cent for all persons in the building above that point who would use that stair, except that the maximum reduction shall not exceed 75 per cent.

For each additional tenant in a building above two, deduct 5 per cent of total allowed capacity, except that maximum reduction shall not exceed 25 per cent and minimum number of persons per unit of stair width need not be less than the actual capacity of the stairs and stair enclosures.

Providing the total number of persons allowed in a building per unit of stair width is not exceeded, it is permitted to increase the number of persons on one or more floors not to exceed 50 per cent of the normal allowance of that floor or floors.

In a building in which more than one inflammability classification occupancy is found, all those floors located above a higher inflammability occupancy shall have their occupancy limited by that higher classification.

COMMITTEE RECOMMENDATIONS REGARDING TABULATION

The committee strongly recommends against open stairs, even in low buildings. It penalizes open stairs heavily in the tabulation.

The committee recommends alarm systems and exit drills under ordinary conditions.

The committee recommends that the distance from any point where a person may work to the nearest available exit measured along the line of travel shall not exceed the figures in the following tabulation:

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High Inflammability.....	75 feet
Moderate Inflammability..	100 "
Low Inflammability.....	150 "

CLASSIFICATION OF OCCUPANCIES BY INFLAMMABILITY OF MATERIALS MANUFACTURED, STORED, OR USED

The table in the foregoing section assumes the existence of a classification separating materials manufactured, stored, or used into three divisions of inflammability, namely, high, moderate, and low. Your committee has prepared and submits, in a preliminary manner, for further study and consideration, such a classification, believing that other uses for it may be developed in addition to the number of occupants table.

Over a year ago, the Associated Manufacturers and Merchants of New York State developed a classification of this same general type, with the thought that it could be used in the same manner advocated by your committee.

This association was good enough to permit us to use its valuable table as a foundation for our work, and our classification as submitted herewith varies only slightly from the association's table. The chief change is that we have added mercantile and storage occupancies, whereas the association table covered manufacturing plants only.

The table is based upon the National Board of Fire Underwriters' publication of December, 1914, entitled "Classification of Occupancy Hazards," which presumably covers all industries of any importance which are found in the United States. This table, we understand, has been formally approved by the Fire Marshals' Association of North America and by the National Convention of Insurance Commissioners, both of which organizations are vitally interested in fire insurance and the classification of fires. It is also being used by the Actuarial Bureau of the National Board in the preparation of its elaborate and valuable statistics.

For the information of the membership, it may be interesting to state that almost without exception classifications have been as follows:

Metal working of all kinds (not including extensive painting or japanning)—"A."

Glass, china, and pottery manufacuring—"A."

Leather working—"A."

Woodworking of all kinds—"B."

Paper working of all kinds—"B."

Woolen manufacturing—"B."

Cotton manufacturing (except cotton gin, cotton batting, and similar highly combustible products)—"B."

Sewing risks (except cotton)—"B."

Tobacco—"B."

Heavy greases and oils—"B."

Explosives, powder, nitrates, etc.—"C."

Flour, starch, and similar mills—"C."

Volatile liquids—"C."

Chemicals which, although not necessarily combustible, may give off dangerous fumes—"C."

Where two or more major processes are carried on in the same building or section, it is obvious that the more hazardous one should be used in establishing the number of occupants permitted therein.

[The classification of occupancies by inflammability of products manufactured, stored or used contains 1,546 classes and is too lengthy for republication in this number.—EDITOR.]

Safety Work Pays

COMMISSIONER LYNCH of the New York State Industrial Commission gave figures at the Industrial Safety Congress at Syracuse to show that if accidents in New York State could be reduced 10 per cent the actual saving to employers in compensation charges alone would more than pay for all the activities of the commission. In 1916 the number of compensated accidents in the State was about 60,000 with compensation amounting to $11,500,000. Some of the industries have reduced their accident rate by from 30 per cent to 75 per cent as the result of adequate safety provisions.

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The National "Drive" Against the Perils of Fire

Editorial Note: The work of the committees of the National Fire Protection Association indicates the most advanced points attained in the science of fire prevention and fire protection. Up to this time, America has been very extravagant in its fire waste. "This is the time," President Wilson said in a recent address, "to correct unpardonable faults of wastefulness and extravagance." If all citizens of the United States, men, women and children, will give attention to the prevention of fires they will perform a patriotic duty. It is especially necessary that food supplies be conserved in all ways, which means, among other things, the protection of growing grain, grain elevators, cold storage warehouses, flouring mills, shipments of food in transit, etc., against destruction by fire. Timely selections from the proceedings of the latest annual meeting of the National Fire Protection Association, on various subjects, are appended, and to the readers of this magazine they will be interesting as well as instructive.

ONE HUNDRED MILLION DOLLARS PER SQUARE MILE.—*Committee on High Value Districts:* In a general way there are some indications that high value districts, carrying one hundred million dollars per square mile, will be regarded as coming within the scope of the committee's work and that districts of lesser density of value will be wholly disregarded. The present impossibility of any fairly authoritative approximation of a unit of value upon a cubic basis, leaves the committee temporarily with no means of knowing the average number of stories to be taken as outlining the theoretical border of a high value district.

The indications are already quite clear that the demarcation of a high value district proper must necessarily lie well within existing fire limits and, therefore, the subject of treatment of a high value district resolves itself in a sense into a proposition for fire limits within fire limits, that is to say the high value district to be a specially treated fire limits within the present or ordinary fire limits.

Another special advocacy which has the support of powerful financial interests is complete incombustible construction for cities.

It is estimated, however, that this school of thought will not enter into the problem of high value district treatment to any serious extent for a number of years on account of the practically prohibitive cost of a sufficient number of wholly incombustible buildings together with the fact that combustible contents must be better protected than now, regardless of buildings.

There is this to be said, however, that the argument in favor of fireproof construction, as exemplified in actual practice, tends to lend itself also to the promotion of protected window or protected wall openings.

The indications are that in any scheme for high value protection due recognition must be made of the principle of employment of protected wall openings if for no other reason than because there will always be in every high value district a certain proportion, of incombustible office buildings which in all probability will not be piped with fusible outlets, and yet cannot be converted into cor ˙ıgration stops without some form of window protection.

STAIRWAYS AND SMOKE-PROOF TOWERS.—*Committee on Fire Resistive Construction:* All stairs, landings, and openings thereto in hotels, apartment hotels and club houses shall have an unobstructed width throughout of at least 44 inches, except that handrails may project not more than 3½ inches into such width on each side.

There shall be not more than 12 feet

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vertically between landings of stairs.

All stair landings shall be large enough to permit opening of the doors without interfering with traffic within the enclosure.

Suitable handrails or banisters shall be provided on each side of each flight of stairs.

The treads and risers shall be uniform throughout, and the treads constructed and maintained in a manner to prevent persons from slipping thereon.

No winders shall be allowed.

All stairways shall extend to the street level and open on the street, or to an unobstructed passageway affording safe egress to the street.

All exit stairs which extend to the top floor shall continue to the roof.

Stairways which may be used as a means of exit shall not extend continuously to floors below the street level, unless partitioned off in such manner as clearly indicate the street level and unless the direction of egress to the street be plainly marked thereon.

Smokeproof towers shall not communicate directly with the building on any floor.

Entrance to these enclosures from floors above the street level shall be either from external balconies, or through vestibules entirely open to the outer air, and from floors below the street level through ventilated covered areaways or vestibules.

Balconies shall be of substantial incombustible construction, with solid floors properly drained. The sides of open air stairs and balconies shall be protected by sheet metal or other suitable solid material, to a height of not less than 3 feet, 6 inches.

One smokeproof tower may serve two buildings if the size of the enclosure and capacity of the stairway is adequate for the number of occupants to be accommodated.

STANDARD SPRINKLER PIPE FITTINGS IN 1918.—*Committee on Standardization of Pipe and Pipe Fittings:* The committee presented a progress report on American Standard Sprinkler Pipe Fittings at the 1916 annual meeting and obtained permission to submit the standard to the executive committee with power, as the work was nearly completed and the manufacturers were anxious to have definite action taken as soon as possible so that they could prepare to make the standard fittings. The committee accordingly prepared the standard for 2½-inch to 8-inch fittings, inclusive, for 150 pounds pressure, in co-operation with the sub-committee on Sprinkler Fittings of the Committee of Manufacturers on Standardization of Fittings and Valves. It was also agreed on January 1, 1918, as the date on which these standard fittings shall be put into use. This will allow ample time for the manufacturers to make the necessary patterns, tools, etc., and for the sprinkler contractors to use up stocks of commercial fittings. The Executive Committee adopted the report at its meeting December 15, 1916.

Specifications for extra heavy 250-pound long turn fittings were then prepared and these were presented for adoption, with the recommendation that the fittings be put into use January 1, 1918.

DEPARTMENT STORE CONSTRUCTION.—*Committee on Fire Resistive Construction:* Columns shall be constructed of steel or reinforced concrete.

Structural steel columns shall be protected by at least 4 inches of brickwork with the space between the brick and metal solidly filled with mortar, concrete or masonry, or by 4 inches of hard burned terra-cotta tile with space between tile and metal solidly filled the same as for brickwork; or the columns may be surrounded by substantial steel reinforcement and this envelope solidly filled with concrete, and protected on the outside with 2 inches of concrete, or the columns may be provided with such other protection as may be determined as being satisfactory for full protection as the result of the Investigation on Column Protection now in progress at the Underwriters' Laboratories. The total thickness of concrete protection shall be not less than 3 inches.

If terra-cotta be used, it shall be secured by substantial interior anchors, or

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by an equivalent method of fastening.

In reinforced concrete columns the metal shall be protected from fire by a minimum of 2 inches of concrete. The effective area of such columns shall be taken as the area within the protective covering. In hooped columns it shall be taken as the area within the hooping.

The corners of columns shall be beveled or rounded.

All column protection shall make close connection to the floor construction at top and bottom.

No pipes, ducts, nor wires shall be placed within the area of the required fireproofing of columns or beams.

Plaster shall not be considered a part of any required fireproofing.

All exterior window openings shall be protected by approved fire windows or such other protection as may be approved for the purpose.

All window openings exposed to buildings within 25 feet shall be protected by approved shutters or outside open sprinklers in addition to the fire windows.

All exterior door openings exposed to buildings within 25 feet shall be protected by approved fire doors.

All openings in fire walls shall be equipped with approved automatic fire doors on each side of the wall.

If an opening in a fire wall is made to serve as an emergency exit, it shall not exceed 48 square feet in area, and a self-closing fire door shall be substituted for one of the automatic fire doors.

Interior openings to ventilating shafts shall be protected by approved automatic trap doors or shutters.

Openings in stair and other shaft enclosures other than elevator shafts shall be protected by approved self-closing fire doors.

SIZE LIMITATIONS FOR FIRE WINDOWS.—*Committee on Protection of Openings in Walls and Partitions:* During the past year fire tests of five fire windows for openings 10 feet wide and 12 feet high, provided with unprotected steel mullions between the sash, which varied from 5 to 6 feet in width, have been made at the Underwriters' Laboratories. The results of these tests clearly show that, when properly mounted, certain patterns of windows furnish a high degree of fire protection when made in larger unit sizes than the regulations now permit, and that certain forms of unprotected non-bearing steel mullions can be depended upon to provide a much higher degree of resistance to fire than the fire windows they support.

The following changes in the present rules are therefore recommended:

Non-bearing mullions and horizontal division members shall be securely fastened in place, and capable of resisting all wind stresses and other stresses to which they are normally subject, and exposure to severe fire without the formation of openings or the introduction of other defects that will seriously detract from the weathering or fire retardant properties of the windows they support.

Metal frame containing the sash or glass shall not exceed 7 feet by 12 feet between supports. Larger openings must be reinforced at every point of division by mullions or horizontal members.

ROOFS FOR WOODEN BUILDINGS.—*Committee on Uses of Wood in Building Construction:* Roofs shall be of plank and timber construction and either flat or of saw-tooth form.

The pitch of the flat roofs shall be sufficient for proper drainage.

Plank shall be not less than 2½ inches thick (nominal) splined, or tongued and grooved.

Timber shall be not less than 6 inches (nominal) in either dimension and preferably shall be single stick and with the edge beveled.

Both roof timbers and planks shall be self-releasing at their support on the walls.

Saw-tooth form of roof and other trusses having iron tension members and other metal connection details shall be permitted only in sprinklered buildings.

All exposed woodwork shall be planed smooth.

Roofing shall be of metal, tile, asbestos, tar or asphalt and felt covered with slag or gravel or approved composition.

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STANDARD HOSE COUPLINGS AND HYDRANT FITTINGS.—*Committee on Standard Hose Couplings and Hydrant Fittings:* That the standardization movement, originated and promulgated by this association, is attaining a momentum of irresistible proportions is very evident. Illinois, Indiana, Kentucky, Ohio, Texas and Virginia have under way State-wide campaigns for bringing about the general adoption and use of the National standard hose threads, and in three of these States legislative bills have been considered, making it a State-wide requirement that all protected municipalities provide themselves with the standard threads. Indiana went so far as to get such a bill favorably reported in the Senate, and it was only because we were not sufficiently prepared to show them the practicability of converting adaptable threads to the standard, that the bill was indefinitely postponed. Transportation interests, manufacturing concerns and other private corporations, both in this country and in Canada, are desirous of co-operating in every way possible to further the desired end.

In spite of all this constructive work that has been accomplished, we are confronted with the fact that nearly 75 per cent of our cities and towns are still using non-standard threads.

ZERO WEATHER FIRE HAZARDS.—*Committee on Field Practice:* The report of this committee was concerned with but one of the features which vitally affect the service value of a sprinkler system, viz., positive control of its water supplies. While effective supervision of this feature has been neglected in the past, and is an item of particular importance at the present time, it is only one of the contributory factors which have been responsible for numerous and severe losses in sprinklered properties.

It must be admitted that the extremely cold weather of the past winter and its long duration over a wide territory have indicated the necessity of more careful installation and supervision of sprinkler protection in such locations. The general effect upon the upkeep of installations was so serious as to put many equipments temporarily out of commission. In some exceptional instances complications due to such circumstances as the shortage of fuel rendered the situation even more alarming. Much of this trouble could be eliminated were all installations of a standard type, properly supervised at time of installation and strictly maintained at all times.

A "freeze-up" of the sprinkler equipment or its parts leaves the property unprotected against fire. The owner's entire values are thus subject to complete destruction, and the insurance companies find themselves confronted with responsibilities which, could they have foreseen the temporary disablement, they would not have dared to assume.

This hazard from frost has not been competently met. Aside from the customary precautionary notices sent out by certain organizations in the late fall and some occasional more active supervision here and there, the cold weather hazard has been left largely to chance; frozen tanks, frozen mains and risers, frozen hydrants, systems temporarily shut off to prevent freezing, and so on, being taken for granted.

The extremely serious consequences of the last spell of very cold weather, so far as sprinkler installations are concerned, indicate that there is grave possibility of even heavier damage in the future.

CONTAINERS FOR MOTION PICTURE FILM.—*Committee on Explosives and Combustibles:* All motion picture film must be kept, except during the actual time that it is being subjected to a manufacturing operation or to examination, in containers.

The present type of metal plain container is of value as preventing the unrolling of film in handling, and eliminating in part the danger of a spark or small flame igniting the film. Experiments have shown that they have little heat insulating property and that a burning film will quickly ignite adjoining film in such containers.

It is recommended that containers be constructed as follows: Containers of

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metal should be at least 25 U. S. gauge, lined with .06-inch thick fiber board or asbestos board. No metal or rivets to pass through the liner or to be used to hold metal and insulating liner in contact. Containers of other material should be of equal rigidity and heat insulation. All containers to be corrugated on top and bottom; corrugations to be at least ⅛ inch deep net. Top and bottom of container should overlap at least one inch.

MODEL FIRE PREVENTION LAW.—*Committee on Laws and Ordinances:* The committee feels that the association should prepare a model fire prevention law general in its scope. The administration of the details of fire prevention is largely a matter of local development and for that reason the committee feels that at first its model law should be in such shape that it can be adopted either by the various municipalities as an ordinance or as a part of local charters. The model law should not concern itself too minutely with details, but should be designed rather to give a flexible and, at the same time, vigorous authority to enforce whatever means and practices of fire prevention should be decided upon by the local authorities. More and more in our lawmaking we are getting away from incorporating in laws details which can best be developed by experts in the concrete problems to which the laws refer. What we need is a fire prevention law which will give authority to the administrative officials to decide upon the details.

RATE OF TEMPERATURE RISE DEVICE.—*Committee on Protection of Openings in Walls and Partitions:* The rate of temperature rise device for fire doors is very much more sensitive to fire than the fusible link, and under the same fire conditions will operate and release fire doors far in advance of the fusible link.

In four tests made, the rate of temperature rise device operated in all cases in sufficient time to permit the doors to close before there was any danger of fire passing through the wall opening, while in only one case was it clear that this was accomplished by a fusible link, and in this case the margin of safety was slight. In two cases the fusible links failed to operate, although the rate of temperature rise device operated in 34 seconds and in 1 minute and 15 seconds, respectively, in these tests.

In the first and second tests, the rate of temperature rise device operated in approximately one-third of the time required for the most sensitive fusible links, and in about one-fourth of the time required for the least sensitive of the fusible links.

In the third and fourth tests, the rate of temperature rise device operated and the fusible links failed to operate.

The tests indicate that under average normal conditions in fairly still air an approved form of rate of temperature rise device will probably operate in less than one minute when exposed to reasonably small freely burning fires several feet distant, and that 1½ minutes is a safe limit of performance under such conditions. The tests also indicate that about double this, or 3 minutes, is a reasonable limitation for fusible links under the conditions mentioned.

Consideration of the spread of fire through wall openings in its relation to the life hazard indicates the desirability of the promptest operation of the fire doors where the passage of fire through such openings is especially hazardous to life.

DESIGNS FOR STANDPIPE SYSTEMS.—*Committee on Standpipe Systems:* Next to the automatic sprinkler equipment, a well designed, properly equipped, and reliably maintained standpipe system constitutes the best means for the extinguishment of fire in buildings. Each of these equipments is capable of furnishing a class of service of which the other is incapable, and, in most cases, they should be made to serve as complements of each other. The standpipe system furnishes the only reliable means of obtaining effective fire streams at the upper stories of high buildings, and of furnishing such streams in the shortest possible space of time.

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Standpipe and hose systems can be designed for use by fire departments and those trained in handling heavy fire streams; they can be designed for use by the occupants of buildings in first aid fire protection service; or they can be designed to include both of these classes of service. Standpipe and hose systems should provide, ready to hand, all that is required for the class of service intended.

Systems designed for use by trained men should be capable of furnishing the high power streams required during the more advanced stages of fire, on the inside of buildings, and the heavy caliber streams necessary for exterior protection and for fighting fire in one building from another.

Systems designed for first aid service should afford a ready means for the control of incipient fires by the occupants of buildings during working hours, and by watchmen and those present during the night time and holidays.

CABINETS FOR MOTION PICTURE REELS.—*Committee on Explosives and Combustibles:* It is recommended that only such cabinets as are listed by the Underwriters' Laboratories for the storage of film be used. In general, cabinets should be of a design and so insulated, that a naked reel of film burning on the outside of a cabinet will not ignite the contents, or if burning in one compartment, it will not ignite the contents in the other; in both cases contents to be assumed as naked reels. The racks or drawers must be so arranged that the film containers immediately adjacent to the partitions do not touch same on either side. Spacers should be provided so as to have such containers at least ½ inch away from the partition on either side. Separating partitions may be constructed of ⅜-inch hard asbestos board, or of ¼-inch soft asbestos board enclosed between steel or iron sheets, 22 U. S. gauge. The exterior sides of cabinet and doors may be composed of ¼-inch asbestos board carried on a frame work of 1¼x1¼x⅛-inch angles, or may be made of 18 U. S. gauge metal, double walled, with 1½ inches of air space. The shelves or racks within the cabinet must be of metal and arranged to store film containers on edge, and so arranged that film cannot be placed under or between containers in the vertical position. Doors to compartments must be so arranged and weighted as to remain normally closed by gravity, must be kept closed by catches on at least three sides, and must be normally sufficiently tight to prevent the entrance of flame due to the burning of a reel of film in an adjoining compartment. Doors on divided cabinets must swing from the center so that they will not expose the contents of one compartment to the other.

PRIVATE FIRE SUPPLIES FROM PUBLIC MAINS.—*Committee on Private Fire Supplies from Public Mains:* For most water works systems there has been no proper distribution of that part of the cost of the works due to the requirement to furnish fire service to the community. There is no question but that a considerable percentage of the cost of public water systems is due to the necessity for supplying water for extinguishing fires. This cost has often been distributed to water users in proportion to the amount of water consumed, although this often bears no relation to the fire service the user obtains.

The most practical plan appears to be to distribute this cost to all citizens, as all receive the benefit, and the general tax levy is probably the most workable basis, although not exact in every case. It is evident that this charge is of the same nature as the cost of maintaining a public fire department and therefore should be distributed in the same way.

This would result in every taxpayer being entitled to fire protection and leads to the conclusion that an owner who puts in private equipment is simply providing better means for using the water.

The private protection will almost invariably control fires with the expenditure of much less water than if a fire must be fought with hose lines from street hydrants. It follows that the annual charge should be nothing except the additional cost to the water works for inspection and care of the private service.

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REFRIGERATION ROOMS.—*Committee on Automatic Sprinklers:* The committee submitted a progress report on dry pipe sprinkler systems in refrigeration rooms, although it hoped to have definite recommendation to offer. Additional information furnished by the inspection departments is partly to the effect that no trouble has been experienced and partly that ice has been found. Owing to the failure in delivery of material, some test apparatus to determine ice formation from the evaporation of the priming water and from the air pumped into a sprinkler system, was not completed in time to be of value for this report. In addition, the committee has considered non-freezing compounds, particularly calcium chloride and glycerin and water. No conclusion has been drawn, but considerable data has been secured, which is available on application to anyone interested. Acknowledgment was made to the American Society of Refrigerating Engineers for its co-operation.

WIRE GLASS FOR SKYLIGHTS.—*Committee on Roof Openings and Cornices:* (a) For plane skylights or such as are inclined less than 80 degrees to the horizontal, except as noted under (c) and (d), standard wired glass not less than ¼ inch thick or ½-inch plate glass protected with approved wire screens shall be used. The panes to be not over 18 inches wide and not to exceed 1,728 square inches in area. Panes exceeding 48 inches in length shall be supported midway between the ends by a rigid member of the sash.

(b) For skylights inclined at an angle of 80 degrees or more to the horizontal, glass not less than 3/16 inch thick may be used, provided it is protected with approved wire screens.

Where such skylights are subject to exterior exposures standard wired glass not less than ¼ inch thick shall be used. For such sash the unsupported surface of the glass shall not be more than 48 inches in either dimension nor exceed 720 square inches in area.

(c) For skylights over stair, dumbwaiter, air or similar shafts, glass 3/16 inch thick shall be used, not over 18 inches wide, nor more than 720 square inches in area, protected with approved wire screens.

(d) For skylights over stage sections of theaters not over 1/12-inch glass, protected by suitable screens.

Substitutes for glass, such as wire cloth with a coating of translucent, combustible substance or similar material, are not approved.

FIRE RESISTANT PAINT.—*Committee on Uses of Wood in Building Construction:* In view of the great interest which is being manifested by city councils all over the United States and by the public in general in the safety of roof coverings, it is the opinion of this committee that a careful study should be undertaken by the committee in co-operation with the United States Forest Service and other technical and investigating institutions, to determine whether a practicable fire-resistant paint or other fire-resistive method can be applied to wooden shingles so as to reduce their fire hazard.

CORNICES AND GUTTERS.—*Committee on Roof Openings and Cornices:* All cornices, inclusive of those of show windows, and gutters, on the exterior of any building except frame buildings, shall be of incombustible materials. When constructed of sheet metal, cornices shall be riveted in the seams at intervals of not more than 5 inches. Such cornices shall be secured to the walls with metal framing or anchors, spaced not more than 4 feet apart, and extending not less than 4 inches into the wall at top and bottom, independent of any woodwork; or shall be riveted or bolted to the structural steel of the building.

No cornice shall extend more than 5 feet above the highest roof beams of any building, and where the cornice projects above the roof the walls shall be carried up to the top of the cornice. These limitations do not refer to the pediments. Where the cornices of adjacent buildings are of the boxed or hollow type, they shall be separated at the party or dividing wall by solid masonry not less than 8 inches thick;

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in case of wooden cornices on rows of frame buildings separated by brick walls, the dividing wall shall be corbeled out at least 4 inches beyond the face of the cornice and extend not less than 8 inches above the same.

All combustible boxed or hollow cornices shall be stopped off at least every 30 feet by means of incombustible material, other than sheet metal, inserted in such a manner as to make tight joints in order to prevent the passage of smoke or flames.

Where rafters extend into cornices or eaves, the space between the rafters from the plate to the roofing shall be completely stopped by incombustible material, other than sheet metal, to prevent the passage of smoke or flames between the rafters.

TANKS FOR GASOLINE.—In a letter addressed to the chairman of the Committee on Explosives and Combustibles, a manufacturer of gasoline measuring pumps, made the following statement:

"It is our opinion, backed up by an experience extending back a great many years, that self-measuring pumps should be used only in connection with galvanized steel or galvanized iron tanks, and galvanized pipe and fittings. Galvanizing protects the metal and the tanks and pipes remain permanently clean. Black iron tanks corrode and the rust and scale is sucked along up under the valves of the pumps, causing pump disorders. The user invariably takes his pump down and never puts it together tight, leaving it leaking gasoline in every joint. The trouble that is being caused in measuring pumps from this cause is costing our company thousands of dollars, and we believe that action should be taken by the National Fire Protection Association to stop the use of such tanks where they are connected with these pumps."

The committee corresponded with several other makers of gasoline appliances, nearly all of whom report that they have not had such experience. However, as the cost of galvanized tanks is little in excess of black tanks, the committee feels that if black tanks are a cause of trouble, the association should go on record recommending the use of galvanized tanks.

FIRE AND ACCIDENT PREVENTION DAY.—*Committee on Fire and Accident Prevention Day:* In August, 1916, a meeting was called at Niagara Falls, N. Y. At this meeting were present representatives of the National Safety Council, and the National Fire Protection Association.

The purpose of this meeting was to discuss the possibility of making October 9, hitherto celebrated as Fire Prevention Day, a joint "Fire and Accident Prevention Day." There had been for some time a growing feeling amongst our members, particularly those in touch with the safety movement now assuming such nation-wide proportions, that our association should co-operate with the National Safety Council as the corresponding agency in the safety field to secure for this day nation-wide recognition as a time for celebrating and laying particular emphasis upon these two very important phases of the broad principle of conservation of life and material resources. It was believed that, although manifesting themselves in different forms, the underlying principles and fundamental facts guiding these two national movements were so closely related as to make such joint action greatly to be desired in many respects and the matter of a common day of celebration seemed to promise very real mutual benefit. . . .

Plan on which the two associations worked in 1916, which will be followed in 1917:

1. To request co-operation from Chambers of Commerce or similar organizations in cities and towns of 10,000 population or over.
2. That a joint letter should be written to presidents of Chambers of Commerce and their co-operation solicited.
3. Joint letter to be written to the agencies suggested by Chambers of Commerce and their co-operation solicited.
4. Joint letter to be sent to fire chiefs in each city with 10,000 or more population.
5. The secretary of each association to write letters to his own members.
6. The secretary of the National Safety Council to write to the industrial commissioner of each State.
7. The secretary of the National Fire Protection Association to write to the various State fire marshals for co-operation.
8. The secretary of the National Fire Protection Association to draft a joint letter to be sent to Credit Men's Association, requesting that association to circularize its members.
9. A similar letter to be written to Rotary Clubs.
10. The secretary of the National Safety Council to endeavor to get co-operation and support of Ameri-

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can Press Association and the United Press Association.

11. The secretary of the National Safety Council to ask the Council's chairman of the "Conference Committee on Safety and Education" to distribute its proposed publication to schools about October 1, and to ask the schools for their co-operation in celebrating "Fire and Accident Prevention Day."

12. The secretary of the National Fire Protection Association to write to governors of various States and mayors of cities of 10,000 population and over, sending sample copies of proclamation and requesting that similar proclamations be made for October 9, 1917.

13. All the members of the two organizations and Chambers of Commerce to urge local merchants having fire prevention material to display it in their windows during the week of October 9. Mr. Wentworth to write to manufacturers of fire protection equipment and Mr. Cameron to safety appliance manufacturers to co-operate by urging their local dealers to make displays.

14. Consideration to be given to the plan of working through fire chiefs to reach local fire bodies.

15. Suitable data to be prepared for the use of Chambers of Commerce in getting local newspaper publicity.

GUARDING OF INDUSTRIAL PLANTS.—*Committee on Ammunition Manufacture and Safeguarding of Industrial Plants:* The different classes of risks and their products in which we find work being done on shrapnel are in part as follows:

Steel mills (projectile steel bars).

Brass mills (cartridge cases).

Screw machine shops (fuses, primer cups, etc.)

Machine Shops (machining projectile forgings).

Forge shops (forging projectile cases).

Various metal workers (bullets).

Pressed metal works (tin cups, powder tubes).

Powder mills (powder and powder pellets, fulminate caps).

Woodworkers (shipping cases).

Can factories (shipping containers).

Some factories may combine several of these, but in many cases the work is still further subdivided. . . .

In planning to guard an industrial plant against interruption of operation, it is first necessary to have clearly in mind not only the general nature of the dangers to be guarded against, but their exact character. This discussion contemplates particularly the guarding of munitions plants, but the principles apply to the guarding of all public and private producing property. In any time of war or peace the protection of a manufacturing plant deserves serious thought.

In general the sources of danger may be found in:

(1) Fire from inherent causes,

(2) Fire, explosion, theft, or other interference by persons with malicious intent,

(3) Labor troubles, either of normal origin or,

(4) Trouble fomented by persons with motives of an enemy including activities of military or industrial spies, and other visitors.

The means of protection vary in their elaborateness from the simple forms for small shops employing a few men, to the great industrial plants with thousands of employes, covering acres of land which are institutions of vital importance to the nation, and in which highly organized fire protection, guarding, and detective departments are needed. The degree and means of protection required vary in each case, and should have careful consideration. (The committee discussed the general sources of danger and the methods of protection in great detail.)

SCUPPERS IN BUILDINGS.—*Committee on Tanks:* Scuppers will be found most efficient when installed under the following conditions:

Floors should be water tight. In a fireproof building, special precautions should be taken to make the upper floor surface impervious. In case floors are of wood, a waterproof material satisfactory to the Inspection Department having jurisdiction should be installed, either on the surface or under the top floor. This material to be flashed to a point at least 6 inches above the floor level around all floor openings, walls, columns, etc.

Stairway and elevator door sills should be raised in case it is desired not to have the water flow down these openings. (Frequently stair and elevator shafts form a very desirable method of carrying off the water, provided they can be properly drained at the bottom. Where properly located and arranged, such shafts may obviate the necessity of scuppers.)

Substantial metal sleeves should be used around pipe openings and a watertight joint made between the floor and the sleeve. Such sleeves should extend at least 6 inches above the floor.

For the best results, floors should be crowned to slope slightly toward the

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scuppers. A slope of 1 inch for each 20 feet is recommended.

Goods susceptible to water damage should be skidded at least 6 inches above the floor.

Scuppers are at a disadvantage in buildings where the floor space is so filled with stock that the flow of water is badly obstructed. Also where scuppers are so placed that the water must travel a long distance from the point of discharge to the nearest scupper.

DEFINITIONS SUITED TO THE TERMINOLOGY OF FIRE PROTECTION.—*Committee on Nomenclature:*

Fireproof.—The use of the term "Fireproof" is recommended to be discontinued. This general term has been erroneously applied to buildings and materials of a more or less fire-resistive or incombustible nature. Its indiscriminate use has produced much misunderstanding. and has often engendered a feeling of security entirely unwarranted.

Fire-resistive.—The term "Fire-resistive" applies to materials and constructions which will satisfactorily resist fire in accordance with the specification established by the joint Conference on Fire Tests.

Incombustible.—The term "Incombustible" applies to materials and constructions which will not ignite when subjected to ordinary fire. *Alternative Definition.*—The term "Incombustible" applies to articles, goods, wares, merchandise or materials of construction which will not burn or support combustion. Articles, goods, wares, merchandise or materials of construction shall be held to be "incombustible" when the individual units comprising the finished product do not contain combustible material in sufficient quantity to procure such a simultaneous or destructive combustion of these units as would constitute a menace to life, limb or property by fire.

Non-inflammable.—The term "Non-inflammable" applies to materials and constructions which will ignite but will not support flame when subjected to ordinary fire. *Alternative Definition.*—The term "Non-inflammable" applies to articles, goods, wares, merchandise or materials of construction which will support combustion, but will not readily burn. Articles, goods, wares, merchandise or materials of construction shall be held to be "non-inflammable" when the individual units comprising the finished product do not contain inflammable material in sufficient quantity to procure a "flash" fire such as would constitute a menace to life, limb or property; or where the finished product is so wrapped, packed, bundled or wound on cores that its inflammable quality is substantially nullified.

Fire Door.—A door, frame and sill which will successfully resist fire in accordance with the specification established by the Joint Conference on Fire Tests.

Fire Window.—A window frame, sash and glazing which will successfully resist fire in accordance with the specification established by the Joint Conference on Fire Tests.

Fire Shutter.—A shutter which will successfully resist fire in accordance with the specification established by the Joint Conference on Fire Tests.

Self-Closing Door.—A "Self-Closing Door" is one normally closed and which closes automatically after being opened for use.

Automatic Window or Door.—An "Automatic Window" or "Automatic Door" is one which closes automatically by means of a device operated by heat.

Area of a Building.—The "Area of a Building" is the area of a horizontal plane bounded by the outside lines of the enclosing walls. When one or more party walls are a part of the enclosing walls, the lot line or center line of party wall is used as the boundary. The level of said horizontal plane is assumed to be taken immediately above the projecting base courses.

Area of a Story.—The "Area of a Story" is the area of a horizontal plane taken at the level of the floor of the given story and bounded by the outside lines of the enclosing walls of the building. When one or more party walls are a part of the enclosing walls, the lot line or center line of party wall is used as the boundary.

Floor Area of a Story.—The "Floor Area of a Story" is the area of a hori-

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zontal plane bounded by the finished interior surfaces of the exterior walls. The horizontal area of interior columns, partitions, corridors, stairs and elevators is not deducted unless so stated.

Height of a Building.—The "Height of a Building" is the vertical distance from the curb to the top of the highest point of the roof beams in the case of flat roofs, or to the average height of the gables in the case of roofs having a pitch of more than twenty (20) degrees. When a building faces two or more streets having different grades, the datum for measurement shall be taken at the middle of the facade on the street having the greatest grade. When a building does not adjoin the street, the datum for measurement shall be taken from the average finished ground level adjoining such building. In measuring the height of a wall, the height of the parapet above the top of the roof beams shall not be included.

Flat Roof.—A "Flat Roof" shall be interpreted to mean a roof which has a pitch not exceeding 20 degrees.

Curb.—The term "Curb" when used in connection with defining the height of a building is the established mean curb level at the front of the building. If the building fronts on more than one street, the datum for measurement shall be taken at the established mean curb level on the street of greatest width. When this width is common to more than one street, the datum for measurement shall be taken at that having the highest curb. The term "Curb" when used in fixing the depth of an excavation is the established curb level nearest to the point of the excavation in question. Where no curb elevation has been established, or the building line does not adjoin the street, the average finished ground level adjoining the building shall be considered the curb level.

Foundation Wall.—The term "Foundation Wall" shall be construed to include all walls built below the curb, or the nearest tier of beams to the curb which serve as supports for walls, piers, columns, or other structural parts of the building.

Bearing Wall.—A wall which supports any load other than its own weight.

Non-Bearing Wall.—A wall which supports no load other than its own weight.

Party Wall.—A wall used or adapted for joint service between two buildings.

Curtain Wall.—An exterior non-bearing wall built between piers or columns, and not supported by beams at each story.

Panel Wall.—An exterior non-bearing wall in a skeleton structure, built between piers or columns and supported at each story.

Fire Wall.—A wall subdividing a building to restrict the spread of fire. It shall have such thickness as to prevent the communication of fire by heat conduction. It shall have such stability as to remain intact after the complete combustion of the contents of the building on one side of the wall; and its structural integrity shall be unaffected by any wreckage of the building resulting from such fire, or its extinguishment. In fire-resistive buildings with full protection floors and roof, a fire wall need not be continuous through all stories, nor need it extend through the roof. In all other buildings it shall start at the foundation, be continuous through all stories, and extend three feet above the roof.

Fire Exit Partition.—A partition subdividing a story to restrict the spread of fire and sufficiently stable to provide an area of refuge for the exit of the occupants thereof.

Retaining Wall.—A wall which retains adjoining earth or other material producing lateral thrust.

The committee has been requested to introduce the terms "cut off" and "shut off" as applied to vertical openings, and to define them. They are now used by one of the insurance companies. The committee, however, feels that it would be unwise to exploit these terms. They are illogical and confusing, because both refer to the same thing only in different degree. For example, they may both refer to a stairway or elevator enclosure: and when so applied would indicate enclosed shafts, but one would denote a better grade of construction than the other.

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Suggested Regulations for Fire Drills

By Edward F. Croker

Ex-Chief, New York Fire Department

Editorial Note: This is the first of a series of articles by Mr. Croker dealing with the vital subjects of fire prevention, fire hazards, fire extinguishment, etc. During 1916 the New York State labor law was so amended that the onus of seeing that proper fire-drills were given in loft buildings, factories and similar structures, was thrown upon the owners of the buildings rather than upon the tenants. Some practical suggestions are here given, which, if carried out in case of fire, would result in saving many lives, as well as avoiding personal injury and other losses. The next article will treat of inspection of premises with a view to reducing fire hazards, and the organization of fire brigades in munition plants, large industrial works, etc.

NO. 1. All persons in the City of New York, engaged in the practice or business of giving fire drills as individuals, corporations or companies, shall register their names and addresses with the fire department and satisfy the authorities of their ability to successfully conduct and organize fire drills.

2. No person, individual, nor corporation shall be allowed to conduct such drills without permission from the fire department.

3. All persons engaged in giving fire drills shall have on the premises at time of drill at least one man to each floor, in uniform, with authority from the fire department to see that drills are given in compliance with the regulations of said department, as to time off of floor, to street, etc.

4. Reports of fire drills, setting forth the date, time, and premises visited, shall be sent by the person giving such drills, in the form of a certificate, to the employe or owner of the premises, which shall be kept by said employe or owner on file for inspection by the employes or agents of the fire department and State department of labor.

5. All persons engaged in the business of conducting fire drills shall post at their own expense a set of rules and regulations as per the published form of the regulation drill organization of the New York fire department on each and every floor of a factory or other building in which they give fire drills.

6. All establishments, such as department stores, ammunition factories, wholesale chemical houses or other buildings of large size, where more than 300 employes or patrons of such establishments are likely to congregate at one time on any floor of such premises, shall have on duty at all times a retired uniformed member of the New York fire or police departments, possessing a certificate from the fire department as to his fitness to give fire drills and to handle portable fire equipment, as sprinklers, standpipes, hose, fire extinguishers, fire pails, etc.

7. All factory floors and other places containing merchandise or other material shall provide necessary hose, 3-gallon fire extinguishers and other portable fire extinguishing appliances. The brigade on each floor must be instructed in the intelligent use and handling of the apparatus.

8. All persons engaged in the conducting of fire drills under the authority of the fire department are to be given permission to issue summonses to employes or employers who fail to permit fire drills to be held, or who refuse to take part therein.

9. Where manual fire alarm systems are installed, daily tests at 8 a. m., 12 noon and 5 p. m., shall be given to ascertain if the system is in proper working order during business hours.

10. Where buildings requiring fire drills are not equipped with fire alarm systems, at least 3 fire drill whistles or one hand-bell should be required to be placed on each floor.

11. Institutions, such as hospitals, hotels, asylums or theaters, where more than 300 persons are assembled or congregated each day, shall be required to employ a uniformed retired member of the fire or police department to act as "Fire Chief" and to organize the inmates or occupants into fire brigades and give necessary fire drills under such regulations as the authorities may require.

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"The Hideous Waste from Fire"

"A Waste Which Is Least Important on Its Financial Side, Most Important on Its Human Side"

The address of Hon. William C. Redfield, Secretary of the Department of Commerce, was one of the most interesting features of the annual meeting of the National Fire Protection Association. Mr. Powell Evans, chairman of the Fire Prevention Committee of the Philadelphia Chamber of Commerce, expressed the Association's appreciation of Secretary Redfield's address, and of the activities of the Department in the conservation of the resources of the Nation, in graceful words: "His optimism is a working optimism, and that is one of the good features of the present condition of this country. The fact that a man at the head of the great Department which he represents in the National Government will devote so much time as he has this morning to constructive work of this sort shows the spirit of his Department, the spirit of the Government, the spirit of the Nation to-day in caring for everything that is worth while in the country, even in its time of greatest stress."

WE are the most wasteful people in the world, gentlemen. We do not look it, but we are. I sometimes think that it is in our disposition. Anything which is narrow and grasping we dislike. Our whole instincts run counter to it, and by the same token we have acquired the weaknesses of our virtues; I mean that when we react against the small and the narrow and the grasping, we go to the opposite extreme.

I wonder how many of us have seen the statement the Department of Agriculture issued this week, as to the effect upon our food supply of the saving of an ounce of food a day in every one of 20,000,000 families? It would mean an enormous difference in the cost of living in this country if that simple thing could be done. The throwing away of a slice of stale bread in each household in America daily would require the product of over 400,000 acres of wheat land to make good the annual loss.

Think, for a moment, how France has sustained the wonderful struggle which she has made in the last two and a half years. Why has she been able to do it? Do you think any other nation in the world is so placed that it could have sustained that struggle under like conditions? And how has it been possible? Simply because of the thrift of the average Frenchman and his wife. Nothing in the world but that simple habit which we don't know how to practice in this country and which they habitually practice there, has made it possible. France started this war with a debt eight times our own, has multiplied it several times, and is still going on strongly, and it comes back to the saving of the average Frenchman in every case.

I would like to go on with that subject; it is part of your theme. I would like to tell you how France is organized for this purpose. May I take a minute just to suggest this thing, because it bears upon our subject today, after all? How many of you would feel your self-respect heightened if you went into a large city bank and asked for a loan of five dollars? There isn't one of you who thinks he could do that, and there isn't a bank in America that would treat you with any great courtesy or any great gladness—I won't suggest discourtesy—if you did; yet the bank of France, one of the biggest in the world, is obligated by law to make loans of a dollar, and actually does so, and the vast majority of its loans are under $20 in amount, because they have organized France for thrift.

We have organized America upward and outward; we have got to begin, and you are partly on the job, to organize America downward and inward. Now, part of that job is the saving of the hide-

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ous waste from fire losses in this country, a waste which is least important on its financial side and most important on its human side, because it is a visible, an outward and visible, sign of the absence of an inward and spiritual grace. In other words, it is an illustration with which you are painfully familiar, of the fact that the American will not take care, will not foresee, will not look into the future and spend two dollars to save five, instead of spending one dollar on the chance that he may not lose five.

If we built as France builds, as Germany builds, as England builds, there would be very little need of fire prevention bodies. We say, do we not, in the most casual way, as if it involved no element of self-depreciation, that such and such a theater will burn some day.. I went into a building in this city not long ago and went upstairs. I found, in going upstairs, a wooden staircase surrounding four sides of the stair well with a large space between, in which they had put the elevator. The only thing enclosing the elevator was the open staircase. The elevator ran upon oil-soaked wooden uprights, and at every floor was entirely open all around; the floor was all wood and the trim was all wood; the building was joisted construction. You and I know perfectly well that that was an invitation to loss and death. You know, speaking very moderately, that if a fire starts in that building the people in the upper stories are going to be burned, and that to maintain such conditions is to invite disaster. Yet that building is only one of thousands. As you know, such a building would not be permitted in any capital on the other side of the water. There is not a single European city that would tolerate its existence for 48 hours. But we are so tolerant, we are so anxious not to be careful, we so hesitate to disturb anybody, we are so kindly and so generous, and we do care so much for the other fellow and we have so much to do, that we take the consequences and we burn—do we not?—some hundreds of people a year and pay that price.

It is a rather refreshing thing for us to get out of this atmosphere of ours, with all its virtues, and its weaknesses, too, and get into an atmosphere abroad where such things are, in some respects, done better. I remember, for example, having the Fourth of July put up to me in this rather shocking way: A gentleman said to me abroad: "You Americans are a curious people; you revived a custom which we supposed was extinct before the Roman Empire came." I said: "How is that?" He said: "You sacrifice a lot of your children every year to celebrate your national holiday." It was rather a bald way of putting it, but I confess that, as I thought it over, I had to admit it was true. I said to him: "Why, of course, we don't mean to do that; we are just celebrating, and the boys get hurt and burned and that sort of thing." "Well," he said, "you don't have to do it." "Oh, no." "Then," he said, "if you didn't care more to celebrate your holiday than you do to save your children, you would stop it, would you not?" And what had I to say to him? I couldn't explain to him the peculiar, pleasant, delightful, easy-going way we have in so many things. No wonder, gentlemen, if we tolerate several hundred millions a year of perfectly needless loss of money from fire in this country and permit a corresponding loss of life, that people abroad, when we enter into a serious businesslike war, regard us as careless about it, and think we will tackle that job in the same free-going spirit in which we let the other thing run along. They will find themselves mistaken about the war proposition, because we are not doing it that way; but why can't the men of America, I wonder, take this fearful loss of ours and give to it for six months the same wonderful degree of concentration and effort that they are giving here in this city of Washington now to this war problem? If they did, it would be settled very, very speedily. Here to-day are many men of the largest affairs, men representing the greatest interests in this country, who have given them up, who have come here, and, at their own expense, have rented offices, have brought their clerks and are paying their own salaries, solely in order that they may advance the national interests in this time of emergency. It shows a very wonderful spirit. There are

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men working in Washington now at a salary of $50 a month whose income is $50,000 a year—I have a specific case in mind—all because of the national emergency, and yet you represent a national emergency which has always existed, and has been going on and on; and what you seek to prevent would pay a very large share of the interest upon this great loan that the Government is about to make. Yet the very presence of you gentlemen in this city is an evidence that the intelligence of America is awake to the need, and is determined that this particular kind of waste shall stop; and that being so, you have the most cordial—yes, the most enthusiastic—support of the Government in every effort of the kind.

You know, I am sure, what the great Bureau of Standards of our Department is doing in connection with the development of fire-resisting materials; it is a constant, unremitting effort on their part. They have developed apparatus and they are constantly working in the hope that they may advance further, day by day and month by month, the splendid work in which you are engaged. I sometimes think that we lack practical imaginaion in America. I wonder if it is not because we are all so busy with our noses to the grindstone on the particular job on hand that we haven't time to look up and look around; but what you are seeking to conserve is human values, the home and the workshop and the mill and the lives and the persons and the property of your fellow citizens. It may be a business matter, it may be an economic matter, but it is a great deal more than that; for, after all, economics, gentlemen, is not a dismal science if one has vision and imagination enough to look through it. It is the story of human life brought out in terms of work, and if you could accomplish here and now what you seek to accomplish, the greatest thing you would have done would not be to save dollars, it would be to save homes and to save opportunities for employment, to save the lives and the happiness of men and women and children; so that what you are doing is a national service, and in doing it you are serving your country just as truly as the man who shoulders a rifle in the field; and if there is anything we can do to help that cause along, I want you to understand we are anxious to be called upon.

I notice, with great pleasure, that you are meeting at the Bureau of Standards to-morrow. I hope you will find all the fault with it you can, because that is the way we learn. We earnestly hope, we confidently believe that when you get out there, you will see things that are good and interesting. We try to keep in advance of the world at the Bureau. They tell me that if I were ever to be ill and become delirious, I should be saying over and over again: "The Bureau of Standards, the Bureau of Standards, the Bureau of Standards." (Laughter.) And I have sometimes thought that I specially hoped I might not go insane because it would be so disagreeable for my family to hear me saying that over and over again. (Laughter.) Nevertheless, I am deeply fond of that great service, I am very proud of it and of the men in it, and of their devotion, and of the spirit of enthusiasm for reaching out into the unknown and bringing that which is invisible into the light. It is a splendid service, and I am heartily glad you are going. I notice that you are going to take lunch out there; if your experience is as pleasant as mine, you will be very well fed, and, of course (whatever we may think of conservation or anything of that kind) when it comes back pretty closely home, we are none of us anxious to conserve anything if we have not had a good breakfast or a good dinner.

Now, gentlemen, I would like to talk with you about some mutual experiences, about taking an old factory and making it tolerable from the fire standpoint when it was intolerable, about the effect upon human life of what you seek to work out. Your work interests me because it is human, because men and women will be better and happier for the doing of it, and, after all, that is, in the last analysis, the finest object for which you and I can work. I thank you very much. (Long applause.)

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Atlanta Conflagration of May 21

(*Continued from page* 321)

as occurring from sparks on shingle roofs and the chief of the fire department has repeatedly recommended that such roofs be eliminated.

CITY COUNCIL WOKE UP TOO LATE

An attempt was made to better conditions in 1916, by the passage of an ordinance applying to roof coverings, but this ordinance, which was to take effect in January, 1917, was later changed to become effective July 1, 1917, and has never been in force. It would at best affect only new construction, and would not force existing roofs to be replaced; it permits a repair amounting to 50 per cent of the surface and a year later a second repair of the other 50 per cent.

Realizing from the conflagration the hazard to which the continued use of wooden shingles was exposing Atlanta, the City Council, on May 30, put into immediate effect the roofing ordinance, which was passed in 1916, but had been set aside until July 1, 1917. Following this a revised ordinance was introduced, which not only requires roofings to be of fire resistive material, but limits the amount of repair to 10 per cent of the total surface and provides that within 10 years all roofings must be of approved material.

The chief of the fire department has requested a complete motorization of tne department, but no action has yet been taken by the city government.

The urgent need of the water department for additional equipment at the pumping station is generally recognized, and a study is being made by the Board of Consulting Engineers.

WATER SUPPLY

The storage reservoirs have a total capacity of 390,000,000 gallons, assuring supply to the Hemphill station. At this station are two 10,000,000-gallon, a 15,000,000-gallon, and a 20,000,000-gallon pump, giving a total capacity of 55,000,000 gallons.

Normal consumption during the day reaches a rate of 30,000,000 gallons a day; the average pumpage is approximately 20,000,000 gallons a day. Pressures throughout the city range from 38 to 119 pounds, with an average of 70; fire pressures are 15 to 20 pounds higher.

FIRE DEPARTMENT

The fire department is full-paid and consists of 7 engine companies equipped with steam fire engine and hose wagon, both horse-drawn, 6 engine companies equipped with automobile combined pump and hose wagon, 2 hose companies with horse-drawn hose wagon, a chemical company with automobile chemical engine, and 6 ladder companies, 3 of which have automobile equipment. One steam fire engine is in reserve.

ORIGIN OF THE CONFLAGRATION

The exact origin of the conflagration can not be determined. From the evidence available, including the general direction of the wind, and the fact that a pall of smoke was noticed driving in the general direction of Fort and Decatur streets, it is believed that the conflagration started from sparks carried by the wind from the Woodward avenue fire.

EXTENT OF THE CONFLAGRATION

The fire devastated a total area of about 300 acres. The total number of buildings involved was 1,938, of which 47 were brick and 1,891 frame. Classified by occupancy there were 1,537 dwellings and apartments, 42 mercantiles, 351 garages and outhouses and eight miscellaneous occupancies, including churches, schools, special hazards and warehouses. Of the total number of buildings 1,682, about 80 per cent, had shingle roofs.

ESTIMATED LOSSES

It is estimated that the total property loss will be about $5,500,000, of which about $3,500,000 was covered by insurance. Extensive damage was done to the trolley wires, feeders and poles of the street railway system, amounting to approximately $125,000, and probably a

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Photo by Underwood & Underwood, N. Y.

Atlanta is the latest addition to the cities celebrated for having had a conflagration costing $5,500,000 or more. The fire started in a group of small wooden dwellings and burned over a section about two miles long and one-half mile wide. This cut shows men from the Officers' Training Camp at Fort McPherson, Ga., on guard among the ruins.

like loss was suffered by the telephone company. The direct expense of the city was heavy, approximately $20,000 worth of hose was destroyed, and the cost of bringing outside aid will be considerable.

About 10,000 people were made homeless, and many, particularly the negroes, lost everything they owned. The majority of the homeless were being housed with other people in the city, which, although not classed as a direct loss, must be considered as an economic burden due to the fire.

Beginning with an alarm at 11:39 a. m. for a fire in a newly-built cotton compartment of the Atlanta Warehouse Company, there was a continuous number of alarms for that and for two succeeding fires until practically all the apparatus and men were out of quarters. The fires were as follows:

OPERATION OF THE FIRE DEPARTMENT IN THREE PRECEDING FIRES

First Fire, 11:39 *a. m.—Atlanta Warehouse Company.*—Building was in the area bounded by Murphy avenue, West Glenn street, Stewart and Shelton avenues, in the southwestern part of the city, and about one and one-half miles from the center of the business district. The building was being equipped with automatic sprinklers, but was being used in the meantime to store 494 bales of cotton and 49 bales of linters. The latter and about 170 bales of cotton were damaged. The alarm was received by telephone. At 11:51, after an alarm had been received for the second fire described

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below, Assistant Chiefs Pressly and Courtney requested two extra wagons. Fire alarm headquarters sent Hose Company 1, Automobile Pumping Engine 6, which had filled in at headquarters in place of Chemical 1, and also the horse-drawn steamer of Engine Company 9. Engine Company 6 was sent back to headquarters before 12:16, but the remaining companies were occupied at this fire until after the fourth fire, or big conflagration, started, and one or two were held until about 2:00 p. m.

Second Fire—11:43 *a. m., York and Ashby Streets.*—This location is nearly two miles from the business district and about one-fourth mile due west of the first fire; because of this, little apparatus was immediately available. The fire was in a frame residential section with mainly shingle roofs. Three buildings, not very closely grouped, were destroyed and several damaged, principally from flying sparks on the roofs; some of these buildings ignited were 100 to 200 feet away and as the wind was blowing about fourteen miles an hour and towards the more closely built part of the town, conditions appeared serious to Chief Cody, who had responded with the first apparatus.

Third Fire—12:15 *p. m., Woodward Avenue and King Street.*—A telephone alarm was received for a fire at this point, located about three-fourths of a mile southeast of the business district, in a closely built area, occupied by cheap frame dwellings, all with shingle roofs in mainly old and poor condition of repair.

The closest company was Engine Company 10, about one-half mile east. For this alarm the hose wagons of Engine Companies 10 and 4 were sent; also Engine 10 and the automobile aerial of Ladder Company 1. Except for this last, all apparatus was horse-drawn. At 12:16 box 73 was pulled, and numerous telephone calls were received, reporting that a severe spreading fire was in progress. Automobile pump and hose wagon No. 6, which had returned to headquarters, was dispatched, but reported a tire off and out of service before reaching the fire. Horse-drawn hose wagon from Engine Company 11, which was covering from Station 4, was dispatched to take the place of the hose wagon of Company 4, which had broken a breast strap en route, and the hose wagon and steamer from Engine Company 3 sent to take the place of Engine 6. Both Engine 6 and Hose Wagon 4 later reported at this fire.

At 12:20 box 73 was pulled for this fire and at 12:33 box 74; at 12:30 additional help was requested and Engines 4 and 5 were sent.

BEGINNING OF THE CONFLAGRATION

Fourth Fire—12:46 *p. m.*—A telephone alarm was received for a fire on the roof of a one-story, small, frame shanty, used by the city for storage, and adjacent to another one and just east of Skinner's warehouse, near the corner of Fort and Decatur streets. This location is northeast of the Woodward avenue fire and across the railroad about 2,500 feet. Although the United States Weather Bureau records, taken on the top of the Empire building, show a wind blowing due north from 11:30 a. m. throughout the day, the general path of the resulting conflagration is slightly northeast and almost in alignment with the Woodward avenue fire. It is probable that near the ground level, because of topographical conditions and the proximity of the high buildings of the congested value district to the west, the wind was sufficiently deflected to carry embers in this direction.

Ladder Company 11 and the steamer of Engine Company 11 were the only companies in quarters on receipt of the alarm for this fire. The men of the ladder company report that, upon arrival, all the fire was on the exterior of the roof, but it had reached too great a magnitude to extinguish with the chemical in the 60-gallon tank carried. As no hose wagon responded with the engine, it could not be used for about 15 minutes, during which time the fire had spread to the adjacent buildings. The men on Truck 12, which in transferring had to pass through Decatur street, also saw this fire before Truck 11 had arrived, and tried to report it by telephone to headquarters, but could not get a connection.

Box 46 was pulled at 12:46 and help was also asked for by telephone. The

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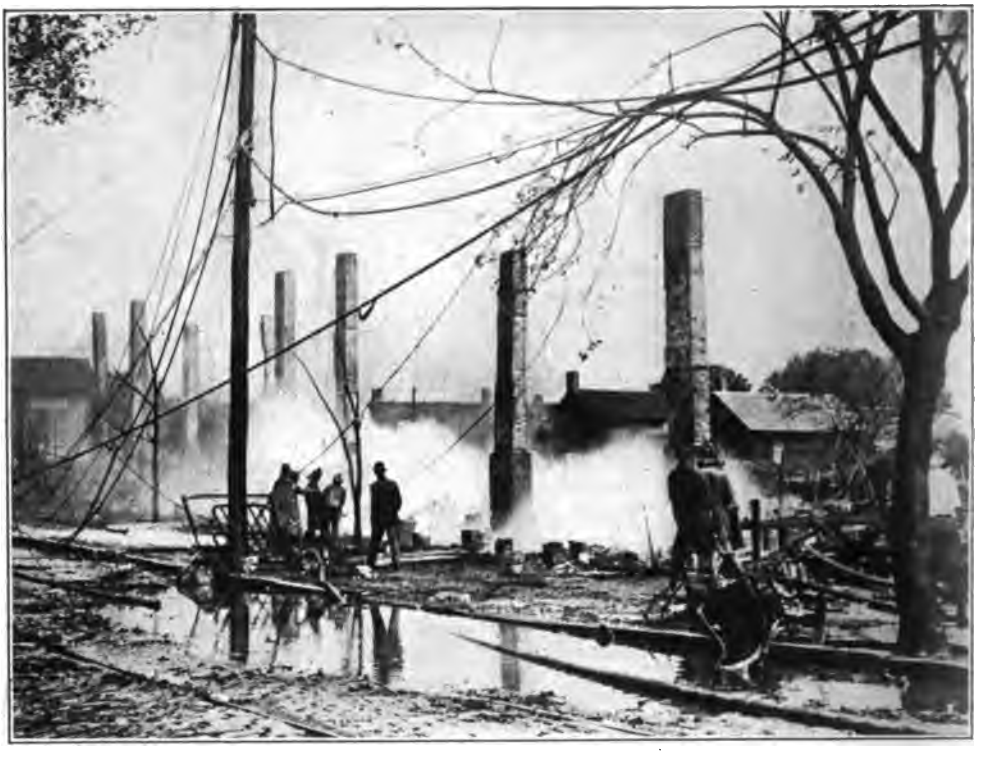

Photo by Underwood & Underwood, N. Y.

Firemen working on still burning ruins in Atlanta's great fire of May 21. Only the chimneys are left of this row of buildings. About 1,938 buildings were ruined, ranging from small shacks to some of the city's finest homes. The only business buildings burned were several warehouses near the point of origin. Only one life was lost, that of a woman who died from shock. Preparations are being made to rebuild the devastated section.

fire alarm operator, realizing the seriousness of conditions, got in touch with the fire department of Decatur, East Point and Marietta and requested assistance; all of these departments responded.

Soon after 1:00 p. m., about 15 minutes after this fire started, apparatus from the other fires began to arrive.

CONDITIONS DURING THE CONFLAGRATION —SEVEN FIRES AT ONE TIME

The spread of the fire locally was very rapid, because of the close grouping of the small frame buildings and the condition of the roofs: This fire was eventually controlled and did not pass Edgewood avenue by direct contact; a considerable part of the block south of Edgewood avenue, consisting of mainly brick buildings and including the sprinklered Trio Laundry, was not burned.

However, long before the fire had spread to Edgewood avenue flying embers had spread the conflagration blocks ahead of the actually burning buildings.

These embers, lighting on the dry roofs, quickly ignited the tinder-like shingles, with the result that a series of conflagrations was in progress, extending over the area and from a quarter to a half a mile ahead of the fire department.

Persons viewing the fire from the high buildings to the west of the burned area report as many as seven distinct fires in progress at the same time.

Operations on the east side of the fire were mainly with hose streams; various apparatus bringing spare hose permitted operation all along Fort street, and as buildings on both sides of this street were low, and evidently the wind was carrying the embers away from this

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Photo by Underwood & Underwood, N. Y.

The Atlanta conflagration. Skinner's storage warehouse was the first large building to burst into flames. It was in the poorer quarter of the city and quickly ignited the surrounding buildings, many of which were inhabited by negroes.

street, it was possible to keep the fire from crossing except in a few isolated cases, which were extinguished before much more than the roof had become involved. Except where there was a severe direct exposure, the buildings just east of Fort street and north of Irwin street were saved. This indicates that the actual spread of the conflagration was not due to a wave of heat, as is usual.

The appearance of many of the trees in the burned area also clearly indicates that a true conflagration condition did not exist; the rapid spread by embers on shingle roofs, with the fire jumping blocks ahead, in part accounts for this. Evidence is clear that in many cases the actual burning of the houses was against the wind, adjacent buildings being ignited to the south of one of which the roof had previously caught fire. This resulted in a series of local conflagrations, which burned themselves out on reaching an area already consumed.

A typical example of the absence of a conflagration wave is shown in the buildings saved at Highland avenue and Boulevard, and again at Ponce de Leon avenue and Jackson street; at this last location, 4 dwellings of brick veneer and with fire-resistive roofs were not ignited, although evidently in the path of any heat wave which might have existed. Also the buildings and trees north of Ponce de Leon avenue were heat injured to only a slight extent, but several houses were damaged by the shingle roofs igniting from sparks. Several other instances of buildings partially or directly in the path of the fire, but not directly or seriously exposed, indicate the value of fire resistive roof coverings.

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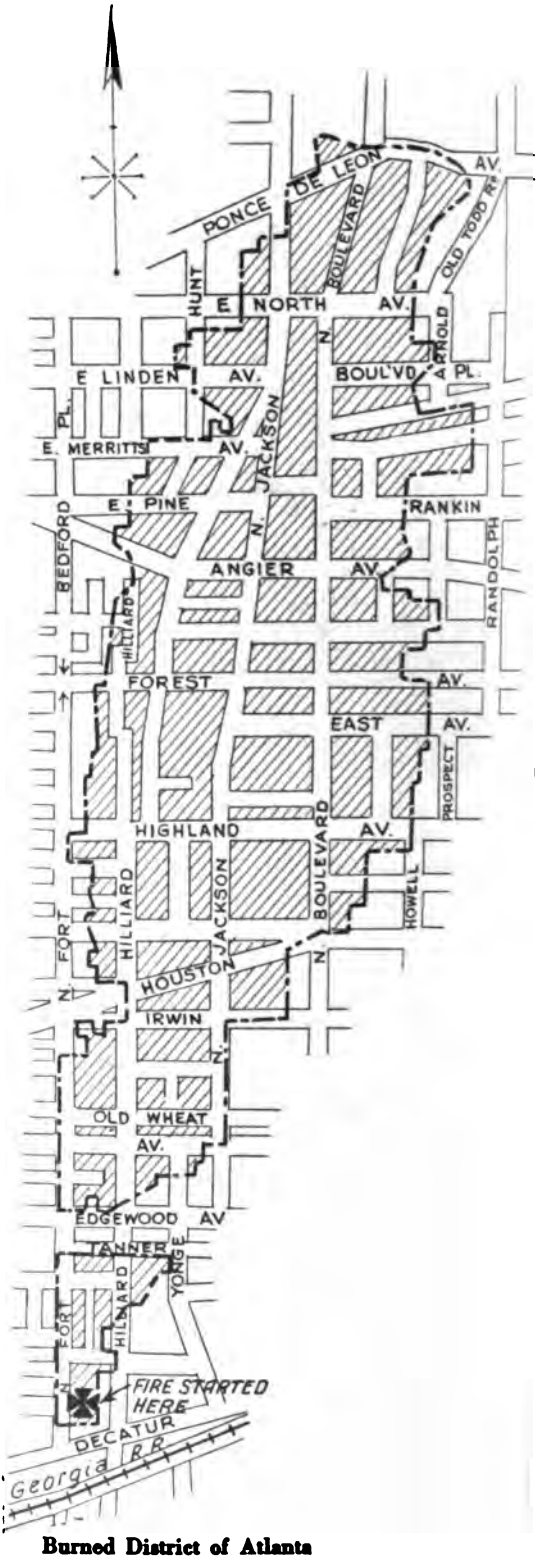
PERSONAL OBSERVATIONS BY AN ENGINEER OF THE SOUTH-EASTERN UNDERWRITERS' ASSOCIATION

Arrived at scene of fire, Fort and Scofield streets, about 1:30 p. m. Fire burning fiercely towards Edgewood avenue. Observed with interest the difference between direct hydrant streams and streams from pumping engines; the latter much better and where employed showed appreciable effect. About 1:45 p. m., saw roofs north of Auburn avenue about Old Wheat street begin to ignite from sparks; and fire began jumping blocks at a time and traveling at a high rate of speed. Saw number of lines laid out in this vicinity, but without nozzles. Fire reached Irwin street about 2:20. Direct hydrant streams fairly good, but engine streams much better. Crowds beginning to get thick and traffic very congested. No police in evidence.

Citizens who were willing to help were not directed what to do and considerable confusion resulted. All fires observed in incipient stages were on shingle roofs. At 4:00 p. m., fire had reached Angier avenue and was traveling from roof to roof and block to block at a high rate of speed. At about 6 p. m., fire was at Ponce de Leon avenue. Much dynamiting being done, but apparently little good done except that it permitted wetting down with more ease. Number of buildings dynamited after they were on fire and much burning debris thrown high in air. Soldiers organized; doing good work with bucket brigade north of Ponce de Leon avenue keeping roofs wet and preventing spread from sparks, also in directing traffic, keeping crowds back and in handling hose streams. Shortly after dynamiting commenced, observed fire north of Ponce de Leon about St. Charles avenue. This did not reach large proportions. Observed a decided difference in intensity of heat and spread of fire about 6:30 and at 7 p. m. it had ceased to spread and was merely burning out. At 10:00 p. m. fire out, except in isolated spots.

ELECTRICAL CONDITIONS DURING FIRE

The Georgia Railway & Power Company began cutting current from trolley and street service lines about 2:00 p m.,



Burned District of Atlanta

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and this work was continued with a force of 40 men until all current in the burned district was cut off at 4:30 p. m. Current from series arc lighting circuits was cut out from the power station. Trolleys were not divided into short sections in the burned district, hence it was necessary to cut current at a large number of places before all current was finally off.

The fire department reported some trouble with live wires, but as a whole, their work was not hampered by electric wires except at the fire on Woodward avenue where trolley line fell and burned hose.

ALARM SERVICE

Throughout the early progress of the fire, boxes were pulled until they had run down.

The telephone switchboard was at all times in continuous operation, with people reporting fires and urging greater action. Although a one-way trunk line is provided from each telephone exchange, these are not reserved for fire calls, and apparently no attempt was made by the telephone company to hold any trunk open for the use of the department. Repeated attempts were made by members of the fire department to get in touch with fire alarm headquarters, but all trunks would be busy and in some cases the operator would not cut into a busy line to give the connection. The need of reserving trunks for fire department use, particularly at time of fire, was strongly indicated by the difficulty thus obtained. To a large extent the fire department had to depend upon messengers for keeping in touch with fire alarm headquarters. The fire alarm operators off duty reported to fire alarm headquarters, but as there was little that could be done, they responded to the fire and acted as messengers, as fuel drivers and also as firemen. One operator, who is also a chauffeur, operated Engine 16 for several hours.

Two circuits were put out of service by 7 boxes and aerial line burning, but this did not result in any alarms being lost.

Telephone service in a large part of the city was seriously affected. Aerial lines in the burned area were largely in cables, all of which were destroyed by the sheaths melting.

OPERATION OF THE WATER DEPARTMENT

At the beginning of the fire the 20,000,000-gallon and one of the 10,000,000-gallon pumps were in operation. At 1:30 p. m. the 15,000,000-gallon unit replaced the 10,000,000-gallon pump, but at 2 p. m. this had to be started again and at 5 p. m. the remaining pump, a 10,000,000-gallon unit, had to be started and run until 7 p. m. The other 10,000,000-gallon pump was shut down at 9 p. m. The Venturi meter charts from the largest pump indicate rates varying from 13,000,000 to 20,500,000 gallons a day.

The water department estimates that for the 24 hours ending at midnight, the excess pumpage over that of the preceding Monday was 8,000,000 gallons; this excess was all in a period of 12 hours, indicating a rate due to wastage and use on the fire of over 16,000,000 gallons a day, or 11,000 gallons a minute. At time of the maximum draft, between 3 p. m. and 7 p. m., indications are that the excess rate was at times nearly 20,000,000 gallons a day or 13,000 gallons a minute. At midnight, when practically all fire fighting had stopped, the largest pump was delivering 2,000,000 to 4,000,000 gallons above the average for that time of the day, and in addition the 15,000,000-gallon pump was in service.

WORK OF MILITARY ORGANIZATIONS

The Seventeenth United States Infantry and the Officers' Training Camp, both located at Fort McPherson, 3 miles distant, and a part of the Fifth Regiment and the Governor's Horse Guard, Georgia National Guard, in camp at Lakewood, 6 miles distant, were ordered to the city.

Upon arrival, the soldiers were separated into detachments and proceeded to the points where fire was raging, getting into effective action about 5 p. m. They did most valuable service, assisting in handling hose lines, guarding property, regulating traffic, which at this time was very much congested, and was badly hampering the work of the firemen, and with buckets in keeping shingle roofs wet ahead of the flames.

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OUTSIDE AID

Aid was asked from Decatur, Marietta, and East Point at about 1 p. m., and about 2 o'clock aid was asked from other cities. In answer to the calls, the following towns responded:

East Point, Ga.—Six miles distant.
Decatur, Ga.—Six miles distant.
Marietta, Ga.—Twenty-two miles.
Kirkwood, Ga.—Four miles.
Griffin, Ga.—Forty miles.
Newnan, Ga.—Forty miles distant.
Hopeville, Ga.—Eight miles distant.
Gainesville, Ga.—Fifty-three miles.
Rome, Ga.—Seventy-two miles distant.
Chattanooga, Tenn. — Distance 138 miles.
Athens, Ga.—Distance 71 miles.
Augusta, Ga.—Distance 171 miles.
Macon, Ga.—Distance 88 miles.
Greenville, S. C.—Distance 160 miles.
Knoxville, Tenn.—Distance 196 miles.
Nashville, Tenn.—Distance 289 miles.
Jacksonville, Fla.—Distance 350 miles.
Savannah, Ga.—Distance 294 miles.

COUPLINGS

Couplings of the Atlanta hydrants and hose are from 3 to 3 3/32 inches outside diameter male thread, and 7 or 7½ threads to the inch. The cities sending aid had couplings varying from 3 3/16 inches to 3 inches outside diameter of male thread, and from 6 to 8 threads to the inch. Hose secured from Chattanooga, Rome, Gainesville, Knoxville and Griffin could not be used on Atlanta hydrants. Rome brought three and Knoxville one adapter coupling, and their hose could have been used if necessary.

EQUIPMENT

Except for minor mishaps, which delayed the wagon of Engine No. 4 and Automobile Pump and Hose Wagon No. 6, no accidents or damage to the Atlanta apparatus was reported.

Throughout the fire much hose had to be abandoned and was burned. Of a total amount of about 42,000 feet, it is reported that 20,000 feet were destroyed.

Even in the beginning of the fire there was a shortage of nozzles. Many of the companies had left the previous fires without stopping to pick up, and when a line had to be abandoned there would be no nozzle for the succeeding line. Chief Cody sent for all the nozzles that could be obtained from the several supply houses in the city and also obtained play-pipes from various plants in and near the city and from the water department. Lack of hydrant wrenches also hindered operations, both in opening and shutting down hydrants.

Buckets, several thousand of which were obtained from a local dealer, were of material assistance in the hands of the soldiers.

OTHER FIRES AND MEANS TAKEN TO COVER THE CITY DURING THE CONFLAGRATION

At 1:15 p. m., a telephone alarm was received from Bellwood avenue and Oak Grove, in the extreme northeastern part of the city. The person calling was told that there was no one to send and to put the fire out with the means at hand.

About 5 p. m. a large automobile truck belonging to the Sanitary Department was obtained and placed at headquarters, loaded with hose and manned by volunteers, to cover the center of the city. It was not called upon to respond. Prior to placing this car in service, numerous other private and city trucks were in and out of headquarters with hose and other equipment and probably could have been used if another fire had started.

Upon the arrival of automobile apparatus from Macon and Rome at about 8:30 p. m., it was placed in service at headquarters, under the command of ex-Chief Joyner, now State Fire Marshal, and later other outside aid apparatus was placed in service to protect the city, while the local department and some of the outside companies, with the aid of the soldiers, were extinguishing the few remaining fires caused by the conflagration.

DYNAMITING

In the latter part of the afternoon, dynamiting was resorted to in several places. This work was in charge of a representative of the du Pont Powder Company under orders of the Mayor.

Several houses were dynamited at Hunt and Pine streets and on Ponce de Leon avenue and on the Boulevard. Others are believed to have been dynamited, but a record of the number and location of houses was not available, and

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if others were dynamited they were later consumed.

The ruins at Hunt and Pine streets were not burned, and as several companies were available to keep them wet down, it may be that their destruction was of some value in stopping the fire at this point. On Ponce de Leon avenue, east of Kennesaw avenue, about five buildings were dynamited, some of which later burned.

On the Boulevard, north of Ponce de Leon, six buildings were dynamited and two others fixed for dynamiting, but not fired.

Several buildings opposite those dynamited ignited on the roof and four below St. Charles street had their roofs partially burned off, but several companies had reached this point about 6 o'clock and prevented further destruction.

SPRINKLERED BUILDINGS

Only one sprinklered building was directly exposed in the conflagration. This was the Trio Laundry, located on Tanner street, between Fort and Grant streets. This and adjoining boiler room and stable were of brick construction, one story in height and with unprotected windows. Area of main building, 10,434 square feet. Sprinkler protection, covering the entire building, consisted of a dry pipe system, with only supply from the 6-inch municipal main, giving 50 to 55 pounds static on the highest line of sprinklers. An inspector of the Sprinklered Risk Department of the South-Eastern Underwriters' Association reached the building when the fire was about two blocks distant. The inspector tripped the valve and closed all windows and the monitor. He reports that four heads were open before the windows went out. A total of 79 heads was opened, and did excellent service in preventing the spread of the fire in the building, the heads on the first line forming a water curtain.

The fire department had concentrated several companies in and about this neighborhood and officers report playing lines on the window casings at various times. The sprinklers undoubtedly were an aid to the department in preventing the direct travel of the fire at this point to beyond Edgewood avenue, and practically all the buildings in this block were either uninjured or only partially destroyed. The exposure was not excessive, being from small frame buildings 45 feet distant.

Shingle Roofs.—This conflagration, together with two of the other fires occurring at the same time, emphasizes the ease with which spreading fires may develop in cities where wooden shingle roofs predominate, even when the fire department is mainly well equipped and manned. It illustrates the startling suddenness with which such a fire may grow into a conflagration under favorable conditions.

For a period of 8 hours, the remaining part of the city, including the business district, was practically without protection. A shift of the wind during the progress of the fire would have resulted in a corresponding change in the path of devastation, and might have involved the business district, where the high values of the city exist; for it would have been impossible to stop the spread through the shingle-roof area, which even now extends to the edge of that district.

Fire Department. — Apparently the operation of the fire department was all that could have been expected under the circumstances, and the chief should be commended for using every available facility, as well as for making strong efforts to restrict the spread of the flames at such advantageous points as Edgewood avenue, Irwin street, Highland avenue and Ponce de Leon avenue, and for immediately taking steps to secure from local sources additional hose, nozzles and hydrant wrenches, and to summon aid from nearby cities. But all of these efforts were of little avail because of the prevalence of shingle roofs, which permitted flying brands to start local fires blocks beyond the actual fire and far ahead of the location of the fire apparatus.

Motor Apparatus.—This fire very strongly indicates the value of motor apparatus. The long distances traveled by the horse-drawn equipment in responding to the previous alarms prevented their rapid response to the last and largest fire, and the condition of many of the

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horses after these runs hampered the movement of the horse-drawn apparatus during the progress of the conflagration.

Dynamiting.—The value of dynamiting buildings to prevent spread of fire in this case is questionable. It is not apparent from the ruins that any good resulted from such work done on or near Ponce de Leon avenue; with the wide street intervening and the narrow face of the fire, the department, together with the military forces which were doing excellent work at this time, stopped the spread from direct exposure and the wider spacing of the buildings and the newer roofs were very favorable to the work of preventing spread from flying embers and brands. The fire department is of the opinion that the dynamiting on Hunt street was of some value, as it allowed buildings to be wet down with direct hose lines which otherwise would have been of insufficient reach.

Military.—The military organizations performed excellent duty in policing the burning district, thus facilitating the movement of fire apparatus, and it was of inestimable value to have the services of these well-organized bodies of men as aides to the firemen in handling the hose and extinguishing roof fires by bucket brigades.

Hose.—The need of a large supply of hose is emphasized by the fire. Because of the amount of hose necessary to reach the fire without endangering the apparatus and because of the large amount always destroyed in such fires, it is evident that the usual allotment of a complete extra shift for each company is not sufficient and that reserve loaded hose wagons are of vital need. The experience in this and other fires of this magnitude also plainly shows that a liberal supply of hose in stock and storeroom is necessary to provide a supply for the companies after the fire. The practice of purchasing each year an average of 350 feet per company would result in maintaining a supply of good hose for each company in service, and also a good supply in the storeroom for this emergency use.

High Pressure.—The value of high pressures on the distribution system is shown by the extensive use of hose lines direct from hydrants. The places where these were reported as too weak to be effective were mainly on high ground or where the gridiron was weak; the need of a complete secondary feeder system was evident in this connection, and the more general use of 8-inch mains for minor distributers in sections along the edge of the system would have improved the supply. Although no shortage of pump or of boiler capacity was experienced, all equipment at the pumping station was in use, and had one of the units been out of service for repairs or had it broken down during the fire, conditions might have been serious. The need of ample reserve in both pumps and boilers to provide for such contingencies is evident. Numerous hydrants in districts of this character, and hydrants of good dimensions, with steamer outlets and 6-inch connections to the main, are evidently needed to combat a spreading fire.

Telephone Alarms.—There is need of adequate arrangements for the handling of telephone alarms, by which at least one trunk line from each exchange will be reserved exclusively for fire alarms or for communications from the fire grounds, with special supervision by the telephone companies of calls transmitted over these trunks; this is apparent from the large number of calls handled by the department, seriously delaying communications vital to fire department operation.

Streets.—Improved streets are of material value in a conflagration of this kind, as in many sections the unimproved ones made long detours necessary for the apparatus.

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EDITORIAL

Architects and Fire Prevention

AMERICA annually registers a $250,000,000 to $300,000,000 fire loss. This is several times in excess of any other country's contribution to the ash-heap. The time has come when this stupendous waste should show a material reduction each year. The point at which to start in reducing fire loss is in the construction of a building; to construct the building of materials which do not burn.

Here is where the architect's duty lies in specifying, advocating and insisting upon fire resistive construction. How many architects today pursue this policy? The enormous proportions of the fire loss in America is a distinct reflection upon American architects. It indicts them as creators of such dangerous construction. Some 9,000 lives are sacrificed each year to fire. What have the architects to say to this? The architect's advice is sought in planning a building. He should under all circumstances insist upon construction which will not add to the ash-heap and appalling loss of life. He should not allow in his specifications, for instance, wood shingle roofs. He is not doing his duty when he plans a roof of flimsy wood construction, he should insist upon fireproof construction. He should not permit in his plans stairways which, in case of fire, would prove a hindrance rather than a safe exit.

If the architects would see their duty aright as advisers and creators of buildings in America it is to them above all that America must look for a reduction of its national fire robbery. The architectural profession, if it will, can render great service to the country and remove from the profession the accusing finger for being a primary cause of America's fire waste.

SAFETY ENGINEERING earnestly hopes, in calling attention to this matter, that some action will be taken worthy of so important a profession as that of the architect.

The Saloon Is the Scrap Heap

EVERY man who has any doubts on the subject should realize that the saloon is in business to put every frequenter *out* of business. It is the short, quick route to failure and misery. At the end of the saloon path yawns the gutter and the grave. This fact has been proven thousands of times and no intelligent man should question it for a moment. Every man can recall some miserable wreck of humanity who was once on the road to success until he acquired the saloon habit.

Liquor gives its victim no quarter once it gets him in its deadly clutches. It is as relentless as fire. Every self respecting man who believes in himself and feels that he has the power to succeed, must regard the saloon as his lifelong enemy. There is no excuse for any man's going into a saloon. A healthy mind and a healthy body do not need liquor. The effect of drink is a lessening of initiative energy, strength and healthy desire—the qualities which are necessary to every man's success.

The saloon is responsible for the army of wrecks, failures and excuses of mankind—ruined mentally and physically by its miserable trade. Drink will ruin the finest mind and the strongest body. Think a moment—did you ever see the successful, alert men who are forging ahead and highly esteemed

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spending any time in the saloon? No. It is no place for men who have a healthy purpose in life.

Men who have the saloon habit don't get ahead because their employers lose confidence in them as does everybody else. The drink habit is a sure indication that a man is failing both mentally and physically. He is losing confidence in himself, and that is why everybody loses confidence in him. When promotion time comes the saloon habit looms large on the wrong side, and the victim loses out. Quit the saloon for all time. It can't do you any good, and it will handicap you in every good effort you make.

Many of the largest corporations of America today refuse to employ a man who drinks. He is done for before he starts, and the time is not far distant when it will be a hard matter for a man with the saloon habit to get worth-while employment anywhere. No man can drink and succeed.

Allies for Safety

NATURAL, and quite in the course of progress, is the close alliance between the National Fire Protection Association and the National Safety Council. Each organization is helped by association with the other.

SAFETY ENGINEERING is on record as an advocate of close working relations between the organizations that have now joined forces. Founded to aid the fire prevention movement this magazine was a little ahead of time, even in that field. Some years later, when its scope was enlarged to include industrial safety as well as fire safety, protests were heard because the magazine was devoting too much space to subjects unrelated to fire prevention. Unimpressed by that narrow view SAFETY ENGINEERING pursued the course it had laid down for itself and now it has the satisfaction of perceiving and commending the enlargement of vision of those who considered fire prevention advocacy the only thing worth while.

To-day protection against fire dangers makes its strongest appeal when it puts foremost the saving of life instead of arguing exclusively for the saving of dollars. But no one will overlook the fact that the protective construction and equipment that will save lives may be relied upon to save property also.

The National Defense

THE opinion is now held generally that the United States Government has not been slow in preparing for the conflict that has been forced upon the Nation by the European war, deliberately plotted by imperialistic aggressors to put militarism in control of the world. The Government's plans, very detailed and complete, have included a series of conferences with those who represent the Nation's activities, in one way or another. A few weeks ago a day was appointed for the publishers and editors of trade papers to visit Washington, if they chose, and make themselves acquainted with the methods the Government has adopted for bringing the Nation to a state of efficiency, not only as regards the army and navy, but also with respect to the mobilizing of industries, transportation, agriculture and innumerable other things, which, in the aggregate, mean 100 per cent efficiency in all directions, each citizen to do his full duty in the place for which he is best suited. What the newspapers are to the general public the trade papers are in commercial and manufacturing affairs, in the particular lines they represent. Welcomed to the National capital and addressed by members of the Cabinet and members of the Committee on National Defense, every courtesy was shown to the editors and information was given to them concerning what has been accomplished and what is planned, as far as the program had progressed at the date of the meeting. Common sense and business-like principles have been adopted by the President and his advisers and there is reason to believe that the Nation will be proud of the manner in which the problems of the war are to be handled.

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The Accident Prevention Problem in the Small Shop

By Earl B. Morgan

Safety Engineer, Norton Company, Worcester, Mass.

A paper read before the New Haven Safety Council, New Haven, Conn.

SAFETY work is now an accepted thing. Almost all large companies throughout the country are now conducting enthusiastic safety campaigns, but it seems that the small employer has been a little skeptical about undertaking the work. This is only natural, as he feels that inasmuch as his is a small industry the hazard is comparatively light and he can afford to take the chance. Furthermore, he hardly sees his way clear to undertake the financial burden of the work.

REASONS FOR SAFETY WORK

There are two ever present stimulants for increased effort in preventing accidents on the part of the small shop, as well as the large. First, the economic pressure exerted upon both employer and employe by the compensation act; second, the necessity for holding employes, making the men stick, reducing turnover, or whatever one chooses to call the conservation of a working force. Let us discuss the first item:

THE ECONOMIC PRESSURE ON EMPLOYER

The employer is affected by a financial responsibility which cannot be evaded by either himself or his insurance carrier. This burden is reflected in the cost of his product unless he mechanically safeguards all hazards and institutes a relentless campaign in educating his men against careless practices, the only way to lighten this burden, be it direct compensation payments or insurance premium.

THE ECONOMIC PRESSURE ON EMPLOYE

The economic pressure is equally apparent to the employe, although it is a big problem to make him see it, for when injured he loses his total wage during the waiting period of 10 days, or whatever it may be, between the time of accident and the commencement of compensation. Even then he receives only partial wages, two-thirds in most States. In many cases this partial wage is lessened by the medical expenses which he is compelled to meet.

EMPLOYE REAL LOSER FROM ACCIDENT

It has been my personal experience to settle hundreds of compensation claims and, almost without exception, I have found that the injured man was convinced by his unfortunate experience that he was the real 'dollar and cents" loser; that safety work not only benefited the company but yielded as well the reward of uninterrupted wages to the worker.

HOW SAFETY WORK HOLDS MEN

Let us now see how safety work affects the holding of our employes. There is no doubt that the effect of the safety work which has already been done throughout the country is commencing to dawn upon the mind of the average worker. When a workman sees that a company is not keeping abreast with the times in making its shop a safe working place, he is beginning to remonstrate or move to a safer work shop.

AN EXAMPLE

To show you that safety work is bringing results in holding employes, I will relate an experience.

In our company, if a man is absent from work three days our tracer, or "follow-up" man, immediately "looks him up" to see why he is absent. This is done for several reasons. If he has left our employ we want to know why, so that we can correct the fault if there be

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any. If he is kept at home by his own illness, or that of his family, we want to help him if possible. If he is disabled, owing to an accident of which we are not aware, as is so often the case, we want to see that he receives proper medical attention and is returned to work as soon as possible.

In a certain case, our follow-up man found an employe at home with his hand in very bad shape. The employe had injured the hand some 10 days previously, bruising it and breaking the skin, but had failed to report to the hospital for treatment. The hand had become infected and was in a serious condition. Even then our follow-up man had a hard time convincing the man of this critical condition. Finally he persuaded him to report to our hospital and after several weeks of continuous and strenuous treatment, the hand recovered and the man was able to return to work. By the time we were ready to make final settlement, he realized what a close call he had had from losing his whole hand. He appreciated so much what we had done for him, that he openly said when returning to his old job, "The company will have to fire me before I'll leave now. They sure have treated me right." He meant every word of this, too, as was proven only a short time afterwards when he came into our employment office, requesting to be transferred. When asked for his reason he said the gang on which he was working had been talking about "walking out" unless their piece rate was raised. He told our employment department that he felt the company had been square with him in previous dealings at the time of his injured hand, that he knew they would do the right thing this time and he did not want to be a party to any such action. Needless to say, his request was granted. Here was a loyal worker—a direct product of safety work.

SAFETY WORK A SALES PROPOSITION

It seems to me that safety work in any plant is primarily a sales proposition. It has to be sold. First, to the management; second, to the foreman; third, to the men themselves. All must buy it and they must believe in it heart and soul. There must be united effort on the part of all, co-operation to the fullest extent, if success is to be achieved.

THE MANAGER

Show me a manager who does not believe in safety work, and I will show you a plant with continual losses due to accidents. Such an executive is only deceiving himself if he does not believe that safety work pays. By giving it attention, he will not only save himself a great deal of work and grief, but will also relieve his production cost of needless expense. Accidents involve non-dividend yielding expenditures, also waste time, which could otherwise be put to profitable service.

THE FOREMAN

Show me a foreman who says he is too busy with the duties of production to give safety its proper attention, one of the, "We have been doing this for 20 years and never hurt anybody" type of men, who chronically stands in the way of any progressive measures whether it be for the betterment of safety or production, and I'll show you a good man either to convert or let go.

THE WORKMAN

Show me a workman who habitually leaves tools where they will fall on some one; uses tools in improper condition; removes safeguards; oils machinery in motion; leaves openings in floors unprotected; throws boards with protruding nails where some one may step on them; wears loose clothing around moving machinery and all such similar acts of carelessness; and I will show you a liability which will become an asset only by being converted or discharged.

SELL SAFETY TO THE BIG BOSS

Show him it is a saving in dollars and cents as well as a means of conserving his working force. Send him all the data you can get your hands on from time to time as to the successful results of safety work in other plants. In this connection I always think of a certain co-worker who had been laboring heart and soul to get both the management and men to see the benefits of safety work

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and co-operate with him in carrying it through. He wrote me how he had been trying without avail. By the tone of his letter I could see the poor fellow had about lost hope. I sympathized with him in his position and, therefore, took particular pains to write him a friendly letter, encouraging him, advising him to hold out and not give up, and to remember that when they did see the light that they would be with him just as strong as they had been against him. Some time later I saw this friend and he was just tickled to death. He said they were all with him from the big boss down. I asked him how he did it. "Well," he said, "I just kept making a noise until they finally heard me. The climax came when the big boss called me in his office and said, 'Young man, you have sold me the safety idea. I am interested in your work and I am going to help you.'" From then on safety work in this plant boomed.

SELL SAFETY TO THE FOREMEN

Make them understand that the safety of their men is just as much a part of their work as production; impress on them the necessity of properly instructing new men; have them personally caution men guilty of careless practices; make them understand that their attitude toward safety will be directly reflected by their men; place them on actual safety committee work; discuss recent accidents and ways and means of preventing them at regular meetings of all foremen. To borrow a recent diplomatic phrase, hold them to a "strict accountability" for safety conditions in their departments.

If I were a foreman and saw one of my men doing his work in an unsafe manner, I would immediately take his place and show him the right way to do the job. If he was working around a moving machine with loose clothing, I would not merely reprimand him, but would show him the danger and explain it to him carefully, so that he would understand the reason. A demonstration and kindly word of explanation, thus given, I am sure, would leave a lasting impression with this man. Should an unfortunate accident happen, I would get all of my men together immediately and show them how to prevent a recurrence.

Our managers, and superintendents spend hours of concentrated effort in solving difficult problems encountered in production. Also an endless amount of energy is spent by our engineers in designing and installing new machinery, but how many spend the same effort teaching their men the right and safe way to work? Very few, I fear.

SELL SAFETY TO THE WORKMEN

First, show them that the company is going to do its part to the limit by installing all possible safeguards, as well as providing medical attention, locker and wash rooms, eating rooms, and better working conditions; show them that they are the ones who lose most in case of accident; interest them by encouraging safety suggestions, making them feel that their help is needed; put them on safety committee work; keep before them lessons in safety by placing pictures of unsafe practices on bulletin boards; hold safety rallies and have the families present, giving them the lessons by talks and pictures; get into personal contact by a kindly word or by sending personal letters calling their attention to habitual carelessness; and *by all means* enforce discipline for the infraction of safety rules. If a man breaks a piece of machinery or spoils some of our product, we do not hesitate to call him on the carpet. But how many of us discipline a man for a careless practice that has just escaped resulting in a bad accident? We let him go right along chipping without goggles until he loses his eye. We say it is a safety rule to wear goggles and we tell him he may lose his eye unless he does, when we should punish him with a layoff or make him feel in some way that he has committed a most serious offense.

If I were the manager of a small plant, I would certainly see that safety work received attention. I would not let the fact that I did not know anything about it nor that I could not afford an expert stand in the way. I would get all my foremen together and first tell them plainly and forcibly that we were going

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to get busy and cut out accidents; that we were going to protect all dangerous machinery. I would form a foremen's safety committee with instructions to take a regular amount of time each week and go over every part of the plant and report all dangerous machinery and practices. I would see that this committee made a careful investigation of all accidents and put it up to them to prevent a recurrence. I would take out a membership in the National Safety Council and see that the bulletin service was published on a good bulletin board. I would institute a safety suggestion system. I would then have a safety rally, getting all the men and their families together, and tell them what we proposed to do and show them that it was for their benefit.

I am sure such a plan would not involve an excessive financial burden. If persistently followed up, accidents would be few and far between.

Somewhere it is written "All that a man hath will he give for his life." This is no doubt true, and as soon as we get our workmen to regard another's life and limb from this same viewpoint and co-operate in reducing accidents, then shall we be successful.

The other day two men appeared in my office, one of them smilingly holding up a pair of goggles with one lens completely demolished from the blow of a very small piece of grinding wheel. He proudly related how he escaped injury by wearing his goggles. His companion I recognized as a fellow whom only the day previous we had urged to wear goggles, the result of a close call from a severe eye injury. I asked him why he came with his friend. He was a foreigner, and in his broken tongue he told me how he had gone back with the goggles which I had given him and convinced his friend that he should wear goggles too. His advice was timely. This man had saved his fellow workman from a severe injury and probably a lost eye. He was a hero just as much as the man who pulls a drowning man out of the water and receives a Carnegie medal. He co-operated for safety. He was truly "his brother's keeper"—and this is what I mean when I say, co-operation of your men.

It has been said that any new idea must pass through three stages. First, it is ridiculed; second, it is subject to argument; third, it is accepted. The safety idea has reached the final stage. It is accepted.

Injurious Effects of Dust

IN its efforts to improve health conditions in mining and metallurgical industries, the United States Bureau of Mines is investigating the effects of dusts in mining and metallurgical plants on the workers in those plants, and has just published, in co-operation with the Public Health Service, Technical Paper 153, "Occurrence and Mitigation of Injurious Dusts in Steel Works," by J. A. Watkins, Passed Assistant Surgeon, Public Health Service.

To the industrial hygienist, no health hazard to which modern industrial workers are exposed is of greater moment than that of a dust-laden atmosphere. The importance of the effects of atmospheric conditions on the worker has become so generally recognized that many life insurance companies refuse to accept as risks those who are engaged in the so-called dusty trades in any line.

Dust may be injurious in three different ways, depending on the character of the dust particles: (1) By irritant action; (2) by toxic action, and (3) by mechanical action. A dust may act in two ways simultaneously; for example, a dust may be both toxic and irritating. An example of an irritant dust is that from flint chert or similarly siliceous rocks. The particles of such a dust are hard, sharp and angular. When the sharp particles are inhaled, they injure the membranes lining the respiratory tract and set up an inflammation. The result is that the injured tissues form a fertile location for the growth of pathogenic organisms, such as those of the common cold, influenza, pneumonia, or of much more consequence, the causative organism of tuberculosis.

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Humidity—Heat and Accidents

By E. H. Ingram, M. D.

Plant Physician

William Cramp & Sons Ship & Engine Building Company, Philadelphia

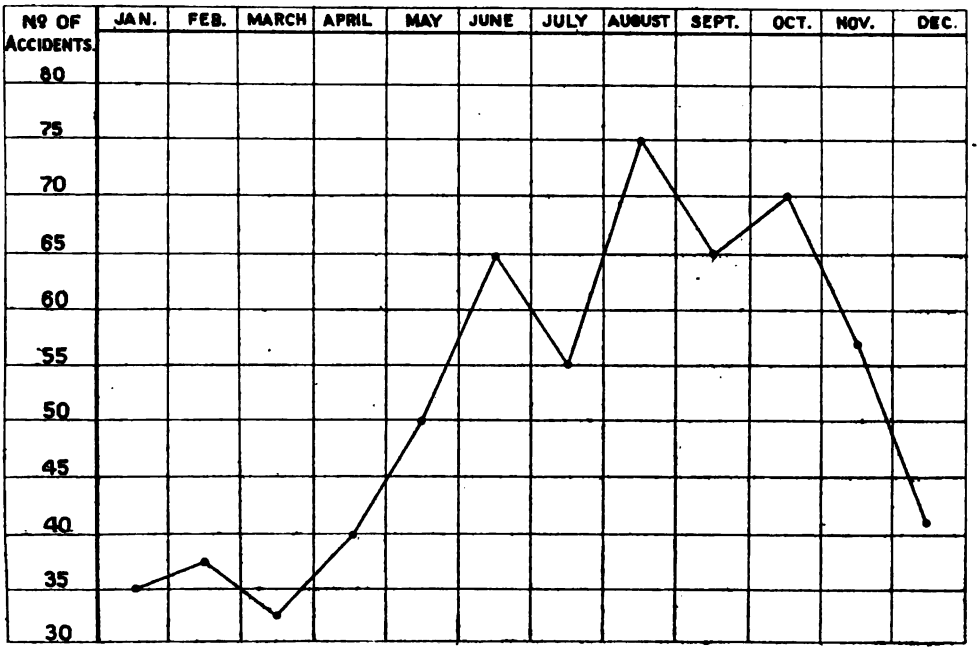
DURING July and August, with the humidity and heat companions in the nineties, our attention was called during the past year to the accident wave by months as it has been found in the shipbuilding industry; the same condition, no doubt, exists in many other plants and establishments.

As is well known, in ship building will be found nearly all divisions of labor: foundrymen, machine operators, yard hands, painters, etc. The outside workers and the inside men are about equally divided as to numbers.

During the past year a temperature ranging between 34 and 54 degrees has been found to be the most suitable for active men performing hard, laborious work. The accidents when such temperatures prevail are fewer, all things taken into consideration, than at any other time. With the summer rise, however, accidents increase, and continue to increase until the autumn decline in temperature, when we notice their corresponding decrease. The accident and temperature curves mount parallel with but one exception, for, it may be noted, that in July there was a decrease in eye injuries due to the distribution of a great number of goggles. For a rise in every ten degrees above 54 we have found an increase in the accident frequency rate of about 50 per thousand 3,000-hour workers. The severity rate also increases, the time lost being chiefly due to fractures following falls, and the infections of slight injuries which are frequently neglected. Falls we have discovered to be as prevalent in summer as they are in winter when the slippery decks and snow add to the normal hazard of the occupation.

In an effort to determine the origin of this increase, we have divided the possible causes under three heads:

Physiological, namely: age, physical



WAVE OF EYE INJURIES BY MONTHS PER THOUSAND OF 3-000-HOUR WORKERS.

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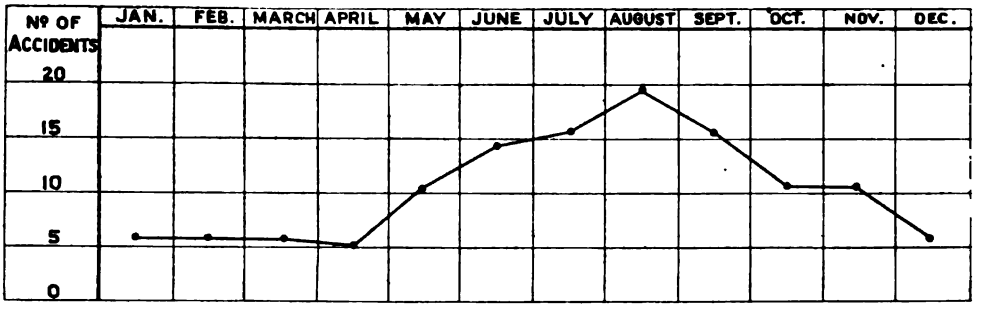

ACCIDENT WAVE OF BURN CASES BY MONTHS. PER THOUSAND OF 3,000-HOUR WORKERS

condition of the worker, personal idiosyncrasies regarding heat, etc.

The *Physical-physiologic,* being the physical causes that impair health and predispose to injury, i. e., heat, humidity, gas from coke fires, iron sheets radiating heat, dust, alcohol, improper food, insufficient water, poor home conditions and sleeping accommodations, steadier work with less time to recover from fatigue (due to the preponderance of good working days), longer days and more opportunity for overtime, and lastly, but of paramount importance, ignorance of sanitary laws.

The *Physical* causes we might claim are those that predispose to injury from a purely mechanical reason. For example, perspiration frequently clouds the goggles causing the workmen to refuse to wear them, with the resulting increase in eye injuries.

Furthermore, thin shirts and lack of sufficient clothing increase the number of burns caused by hot scales and rivets, also the number of trivial scratches, contusions, abrasions and lacerations, which are often neglected and ultimately become infected.

The extra force of men augments the normal hazard by crowding, while piece work and speeding up at this time seem more intense than at any other period of the year. It has also been noted that work in certain stages of progress is more dangerous than at other times before the hull nears completion.

The chief physiologic-physical cause we naturally have found to be heat plus humidity, for humidity seems to be the able assistant of the cardinal cause, heat. Intense temperatures of dry heat may be readily endured in the holds of a ship, if perspiration is free and the air in motion. Hot, moist, motionless air inhibits evaporation from the skin surface. The circulatory vessels are relaxed and the blood rushing to the surface to be cooled, returns unsatisfied. The result is an impoverishment of the blood supplying brain and muscular tissue, causing languor, carelessness, and a general stupor, with the resulting train of accidents due to total indifference.

Pure fatigue no doubt contributes largely as the accumulation of the waste products of muscular activity poisons the system. The increased amount of oxygen needed by the active muscles is not forthcoming and the neuro-muscular adjustment is thrown out of gear. Sleep and rest, the foes of fatigue, do not come to the worker at night, and frequently alcohol, poor hygiene and a hot, sweltering bed room prohibit rest and recuperation, the man returning to work the following morning before he has recovered his strength and vigor. We have often found as many accidents happening on the day following an intensely humid and hot afternoon as occurred on the previous day of greater heat.

With these problems confronting us, just what the correction is would, of course, be something for every plant to solve independently. Possibly a change of working hours would be of some aid, the men reporting earlier in the morning and laying off for a few hours during the intense heat of noon. Rest periods at certain stated intervals should be adopted in every plant, especially at this season. Abolishment of piece work and overtime and the payment of a straight wage might

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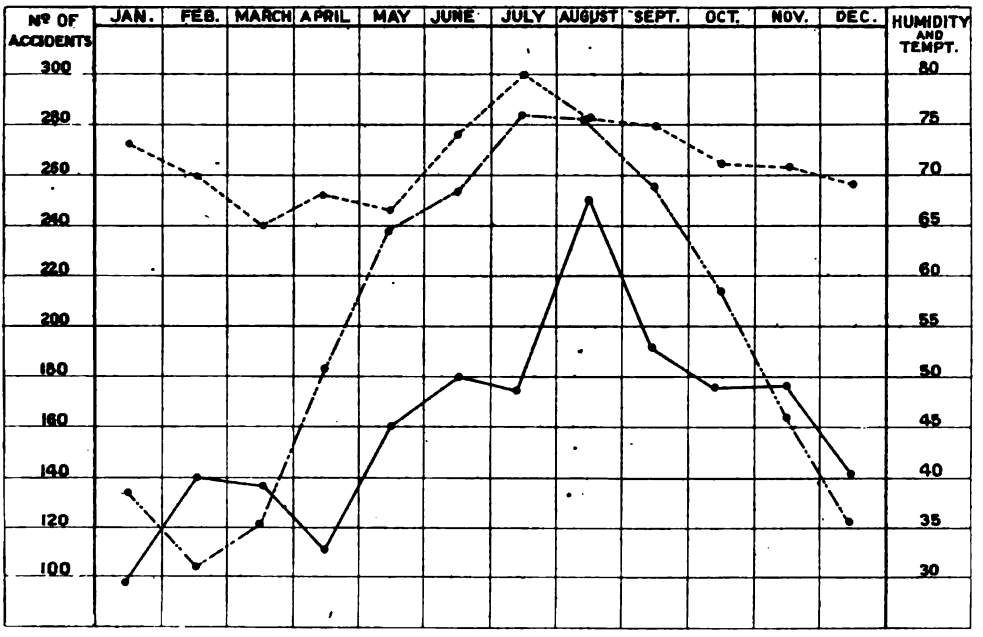

ACCIDENT, HUMIDITY AND TEMPERATURE WAVES

LINE OF EVEN DASHES INDICATES HUMIDITY. LONG AND SHORT DASHES SHOW RANGE OF TEMPERATURE. CONTINUOUS LINES SHOW NUMBER OF ACCIDENTS PER 1,000.

lessen the cupidity of labor and relieve the tense struggle for big pay envelopes at the expense of health and safety. The installation of blowers and forced draft in all possible holds and compartments; the establishment of lunch rooms where proper food is furnished at little more than cost; a rest room with shower baths and lockers. All these instrumentalities will help.

But most important is a campaign of sanitary instruction. The plant dispensary should radiate advice regarding sanitary and hygienic laws; should show the fallacy of beer's being a cooling beverage and the effect of alcohol and hot weather. It should instruct the men as to the causes of heat prostration and accidents in summer, using any and all means that the management will suggest, supply, or tolerate, such as shop paper, bulletins, lectures and personal talks; utilizing the State health department, social service bureaus, or any of the public health divisions that so willingly assist in community welfare.

Summer School of Engineering

THE 19th annual summer session of the College of Engineering of the University of Wisconsin will be held at Madison for six weeks, beginning June 25, 1917. Special courses will be given in chemistry, electrical, steam and hydraulic engineering, gas engines, machine design, mechanical drawing, mechanics, shop work and surveying. All courses given in the university summer session are open to engineering students. Special courses have been arranged for engineering, manual arts, and vocational teachers. For further information, address F. E. Turneaure, dean, College of Mechanics and Engineering, Madison, Wis.

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Hygiene, Sanitation and Physical Examinations

Practical Considerations of Problems of Safety Work Among Employes

By William J. Ezickson, A. B., M. D.

Physician and Surgeon, Atlas Powder Company, Webb City, Mo.

SAFETY work is a fairly recent movement, but consideration of hygienic and sanitation problems of employes and their homes is more recent. There is absolutely no doubt of the great good accomplished by both employer and employe since the inauguration of this work. There are still many who have not awakened to the great slogan of "Safety First," but the number is rapidly decreasing. The only proper sequel to this slogan was the one of "Health First," which has now proven a hand-in-hand companion to "Safety First." There are but few, comparatively speaking, who have turned their attention to the problems of the health of their employes, which I believe should be considered equally with accident prevention. Many take care of their employes injured while at work, but this has been brought about by the requirements of liability laws, although many companies cared for their injured work people long before any such laws were made.

It was at first, and still is, largely one of a material pecuniary consideration. Safety work was taken up because most employers thought it would mean a saving in dollars and cents. This, of course, has proven true, but the great consideration of humanitarianism was forgotten. Now this has developed and we are paying attention to the health of our employes, their hygienic and sanitary requisites, both personal and in the home. Here again the farsighted will see that this will mean a further saving, if you will, in dollars and cents. At first the saving will not be perceptible; it is a matter that will require some little time to make its value noteworthy, but from the humanitarian standpoint it is a proven fact beyond any question of doubt. I believe I can safely state that to watch over his employes' health will be the aim of every intelligent, far-sighted and progressive employer.

I will outline the methods I use at this plant to safeguard our employes' health.

PERSONAL HYGIENE

Every man before being signed on the payroll must be examined by me, details concerning which I shall outline later. A man may possibly have no defect to bar him from being employed, but may have some condition which is detrimental to his well-being, such as decayed teeth, pyorrhea, diseased tonsils, chronic nasal conditions, etc. I impress upon every man the great value of attention to his teeth, nose, throat and ears, and order every man with bad teeth to see his dentist and urge all men to the proper use of the toothbrush and cleansing powder. If a man has some nasal, throat or ear condition, etc., I have him return to my office (at the plant) for treatment.

Every man who has any complaint must come to me for advice and treatment. Whenever possible I give them the treatment and medicine necessary at the plant. They have the privilege of consulting me at any time about any medical or surgical condition.

We have five or six change houses containing lockers. In almost all of them are showers with hot and cold water. At present only one of our change houses has a sloping concrete floor, but we hope soon to have them all of this type. The reasons are obvious. They can be cleaned regularly and thoroughly with the hose, and dirt and other waste matter cannot collect.

Several of the toilets in these houses

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are of the porcelain variety with flushes. At other parts of the plant we have the regular out-houses and these are kept in sanitary condition by frequent treatments with disinfectants.

Lockers are of the steel variety, well ventilated, and each man must keep his locker in perfect condition. They are scrubbed out about once a week. I inspect them at least twice a month and sometimes oftener.

The drinking water at the plant is supplied from a nearby spring and is tested every few months for pathogenic organisms. So far the water has never been found to be polluted in any way. The faucets from which the men drink are of the fountain variety and it is not necessary for the man to place his lips against any part of the spigot.

There are a few men who work about lead or paint. These men come to me once a week to receive a dose of magnesium sulphate, which is considered the best prophylactic treatment for lead poisoning. As yet we have not had a single case of lead poisoning. The men are also instructed carefully on washing their hands thoroughly before eating; changing their work clothes completely before returning home; frequent spraying of the nose and throat and frequent hot baths.

There are 18 or 20 homes of employes adjacent to the plant and I make proper inspection of these houses and surroundings to see that the conditions of sanitation are the best obtainable. Sheds for wood and coal; cans for garbage and tin cans and other debris are provided and we see to its systematic frequent removal. At the present time grass is being sown about these houses so that each one will be surrounded with a garden. Inside, the houses are up to date with electricity, baths, and sanitary toilets.

I give a monthly talk to the entire force and here is where I can accomplish an immense amount of good. I can go into explanatory details just how to follow out my instructions in regard to better care of themselves and their homes. I can emphasize the things that are necessary and in this way, by a direct heart-to-heart talk. I can impress them more than all the signs or bulletins I may post. The talks are systematic and I take up such subjects as ventilation; bathing; what constitutes a proper sleeping room; care of their homes; how to take care of their teeth, eyes, skin, etc.; what foods to eat and their proper preparation; care of the children; prevention of infectious and contagious diseases, first aid, etc.

ACCIDENT PREVENTION AND SAFETY WORK

This takes a great part of my time and attention. At least twice a month three men, chosen from the older employes, and I make a tour of the entire plant. Every building, every floor in every building, and every room on every floor are carefully inspected, as well as the yards and railroad sidings. Notes are made of any condition we find that may lead to any possible accident and these are handed to the assistant superintendent, in turn to the superintendent, and finally reach the general manager of the company. Not only matters for safety are sought for but also those tending to the betterment of hygienic conditions of the workrooms. These matters are taken up at once by the assistant superintendent and necessary repairs or additions ordered. If they have not been attended to by our next inspection they are again reported with emphasis and reasons asked for cause of non-attention. Every machine is examined for proper guards. Signs are placed over every one, "Stop Machinery Before Oiling." Every ladder in the plant is carefully scrutinized for any weakened rung and improper base. If it is in any way defective it is immediately sent to the carpenter shop for repairs, or if very bad it is broken up then and there. The yards are kept constantly free from broken glass, wood and other rubbish. Every man is ordered to hammer down every nail on any piece of lumber he may come across. Large signs with black letters on a white ground marked "Look Out for Locomotive" are placed near railroad tracks. Bulletins are received regularly from the National Safety Council and are immediately posted on bulletin boards in conspicuous places. I cannot speak too highly of these bulle-

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tins. They create considerable interest and, I believe, are of inestimable value.

Many of our buildings are used for making acids (nitric and sulphuric) and here we must carefully safeguard the men from acid burns. Every building, depending upon its size, has anywhere from 2 to 10 showers. Near these showers is a cabinet containing a large bottle of a solution of bicarbonate of soda. If a man is burned with acid, he is immediately rushed to the shower and the burn drenched with water. This is rapidly followed by pouring on the solution of bicarbonate of soda. Then he is brought to the hospital room for further attention by me. I cannot exemplify how much proper safety methods may mean any better than by the fact that last month I had only one case of acid burn and this was so slight that the man was back at work within 15 minutes, notwithstanding that of all types of burns those produced by sulphuric, nitric or mixed acid (sulphuric plus nitric) are among the worst that can be encountered. We handle hundreds of thousands of pounds of acid.

I suppose it may be opportune to state what I do in regard to accidents. Any accident of any type, no matter how small—it may be a simple abrasion of the skin, a small splinter, or a little soot in the eye—must be immediately sent to me. Every foreman is held personally responsible if this is not done, unless the man himself willfully does not inform his foreman. Here again I wish to state that during the last month we had no fatality, no major accident, and the percentage of hours lost on account of injuries was .28 per cent (7/25 per cent). Every injury is carefully recorded and I make special effort to determine whether it was avoidable; if avoidable, whether due to negligence of the injured or a fellow employe; or if due to faulty machinery, tools, light, or working space; whether there is a provision for safety devices and if so whether they were in use or not; the exact appliance or material causing the injury. I interview each eyewitness of the accident and get his statement. I thoroughly examine everything that has any bearing upon the accident and, if deemed necessary, photograph the appliance or material exactly as the accident happened. All this I believe of the greatest importance, both as to ascertaining causes of accidents and remedying them if possible, and as a protection of the interests of the company.

The wearing of proper goggles is also a matter of great interest. Every man on any job on which at any time goggles should be worn is given a pair and is held personally responsible for the proper care of that pair. Every man using the emery wheel is absolutely required to wear goggles, as well as any man engaged in any kind of chipping. All the men working about the acid houses are provided with rubber goggles. They likewise are held personally responsible and must use them whenever working about acid lines or valves, etc.

PHYSICAL EXAMINATIONS

Every man before being taken on is given a thorough examination. I examine the eyes—vision is tested and color test is given. Hearing is tested and discharges are looked for. Height and weight are taken. Nose, throat, tonsils, tongue, teeth and neck are carefully examined. Pyorrhea is especially sought for. Condition of the skin and presence of scars, moles, etc., are noted. Lungs, heart and abdomen are gone over carefully. The blood pressure is taken and the character of the pulse noted. Inguinal and scrotal regions receive minute attention: I look for deformities or results of previous operations or injuries. The history of previous diseases is noted. The general intelligence of the patient is also ascertained. If I deem it necessary I examine the urine and blood.

Any of the following conditions will bar a man from employment: Hernia in all stages; valvular heart disease; tuberculosis; syphilis (active); gonorrhea; chancroid; decided impairment of vision or hearing; advanced alcoholism; chronic bronchitis; chronic asthma (especially for acid workers); epilepsy; insanity or mental weakness; pyorrhea (advanced); contagious skin diseases, viz., scabies, tenia; large hydroceles, arterio-sclerosis; high blood pressure, where heart or kidney complication is a factor; new growth suspected of being

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malignant; convulsions or panting seizures; chronic ulcers of the leg; trachoma; diabetes, anemia and diseases of liver and spleen.

I examine every man in the plant every two months. In this way I am able to keep a watch for any conditions that may arise after employment and keep the men in A-1 physical condition.

Our rule about using alcohol is rigid, for no man with even the odor of liquor on his breath is allowed in. The wisdom of this is surely manifested when one considers the great numbers of accidents occurring on account of men being under the influence of liquor.

In all this work I am fortunate in having the unstinted support of my company, whose attitude toward the movement is illustrated by the fact that it grants compensation and liability payments (based upon rates established where it has other plants, as in Pennsylvania or New Jersey) although the great State of Missouri has not seen fit as yet to enact such legislation.

In conclusion—the slogan of "Health First" is as important as "Safety First." It means better workers physically and mentally, which in turn means greater efficiency. Finally one will find a great saving in dollars and cents. *Above all* it is a great stride forward in helping the cause of "Humanity."

Blast Furnace Gas Asphyxiation

ASPHYXIATION from Blast-Furnace Gas is the title of Technical Paper 106, Bureau of Mines, Department of the Interior, written by Frederick H. Willcox. This report is issued by the Bureau of Mines in pursuance of its endeavors to increase safety and efficiency in metallurgical industries. It discusses the nature and causes of poisoning from blast-furnace gas, itemizes the places where gas may be expected to be encountered, suggests safeguards and points out the precautions to be taken in working about gaseous places.

Blast-furnace gas is peculiar in that it is very poisonous and under certain conditions, as when it has been cleaned, is without color or odor by which it may be detected. Gas is practically always present about the top and bottom of the furnaces, frequently in such small proportion that it is not evident to the physical senses, but at the same time in sufficient volume to cause asphyxiation if breathed for 20 or 30 minutes. Proportions sufficient to cause asphyxiation or "gassing" also occur with more or less frequency all along the route of the gas, at the stoves and boilers when they are taken off for cleaning or repairs, inside of gas mains, downcomers, and other parts of the gas-main system, at sand or goggle valves, and during repairs to the charging equipment and stock line. The increasing application of furnace gas to gas-driven blowers and generators has introduced additional equipment such as tower washers, fans, and other cleaning devices that also must be entered from time to time for cleaning and repairs. At all the above places there is always the possibility that gas may be present where the crews have to work, either from leakage, insufficient ventilation, or from emission of gas retained in the brickwork, flue dust, or deposits in the apparatus. Though poisoning by blast-furnace gas usually results in nothing more serious than illness and severe headache, it may cause unconsciousness and even death, and realization of the dangers and a strict observance of every precaution is essential in undertaking any work in an atmosphere contaminated by furnace gas, or in sending men into confined places, from which it would be difficult to escape, in proximity to material emitting gas or difficult to ventilate.

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, *the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.*

No. 292 ALL INDUSTRIES—BONUSES TO ENCOURAGE SAFETY.—It is difficult to prove the exact advantages derived by offering prizes or bonuses to stimulate carefulness or reduction of accidents. However, I thoroughly believe that the principle is correct.

If the cash bonuses given for results obtained in accident prevention are sufficient in amount to encourage a foreman to take an increased interest in accident prevention activities and his bonus depends upon the amount which is saved in the accident costs, it is certainly worth while.

Where the management of a company can not afford, or does not believe in a large bonus, then I would recommend that prizes consisting of watches, safety service medals, lapel buttons, safety belts, key rings and tags, knives, etc., be given as prizes. These can carry the safety design and will be an everlasting advertisement and reminder of safety, much sought after by the employes.

I have found that the suggestions of workmen have been increased 400 per cent by offering prizes. We must not forget that when we encourage a man to send in a suggestion we also encourage him to study conditions and practices and educate him along safety lines, which is just as important and valuable as the suggestion itself.

I have also seen a noticeable reduction in the number of accidents occurring in departments where the men have gone after prizes offered for that purpose, such as gold watches. Men may be encouraged to read their rule books by giving lapel buttons or safety service medals for passing an examination on the rules. My experience has taught me that unless some incentive is offered, the men will not study the rules.

Prizes bring about a closer relationship between the safety department and the employes and assist greatly in keeping the subject of accident prevention in their minds. They are important factors in any broad gage industrial safety campaign.

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No. 293 VARIOUS INDUSTRIES — GUARD FOR CIRCULAR MOLDING MACHINERY. — Recently while taking photographs of safety devices for my own company I found a guard designed and made by the foreman of a sawmill. The photograph on page 375 shows the guard. The circle is of wood with projecting iron arms which fit into a slot on the square upright, held in place by thumb screws as shown, on the collar, which again can be raised and lowered on the square upright to suit the thickness of the molding. Table shown has two molding cutters, one at each end. One can see that the guard will keep a workman's hands off the top and sides of the cutters. As I have never seen any guard like this, I think it may interest SAFETY ENGINEERING and its readers.

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No. 294 VARIOUS INDUSTRIES — A TALK TO THE PLANT SUPERINTENDENTS AND FOREMEN UPON THE ORGANIZATION OF A DEPARTMENT OF SAFETY AND WELFARE.—The original idea that was to be conveyed by the slogan "Safety First" was that safety should always be the first consideration, and so it should be. However, since that time, various uses, such that the original slogan has lost

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Guard for Molding Machine

some of its punch, have been made of the phrase in advertising and in various lines of that character.

Sometimes, followers of the very good slogan have led themselves astray by thinking of safety at first and then forgetting all about it.

That is not going to be our case, and we are going to go some organizations one better. We are going to have "Safety Always" and "Always Safety" (it works either way), and we will adopt "SAFETY ALWAYS" as our slogan.

Almost the first thing for us to get fixed in mind is the fact that a safety organization and safety work are a sound business proposition which has the added attraction of preventing cripples and preventing suffering of the injured, and of their wives and children, when the head of the family is laid up or killed.

There is a tendency on the part of a good many people to look upon this safety work as a thing that is all right enough, but of not enough importance for red-blooded men to consider. Such people have not given the matter any serious thought.

A safety organization is a sound business asset. It saves time and money for both the company and the individual worker, and for the individual worker it many times saves great suffering, and the necessity of going through life crippled.

As a matter of fact, our country and industries which are acknowledged leaders in most industrial phases, were far behind many of the European countries in taking steps to stop this great industrial leak.

In 1914, in the industries of the United States, there were 35,000 workers killed, and 2,000,000 workers laid up by preventable accidents. There were also 3,000,000 workers incapacitated by occupational diseases (SAFETY ENGINEERING, April, 1915). An estimate by the State Industrial Commission of New York, gives the cost of accidents in New York State during 1915 as $30,000,000 equal to half the cost of the State government.

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An analysis of the experience of other companies has proven that about 75 per cent of the deaths and serious injuries can be prevented:

	Reduced.
Eastman Kodak Company	73 per cent
Illinois Steel Company	70 per cent
Pullman Company	70 per cent

Experience has also proven that only one-third of these preventable accidents can be prevented by mechanical guards, the other two-thirds must be prevented by the foresight of thinking individuals, for they are due to carelessness or ignorance.

An analysis of our own accidents shows that about 80 per cent are the result of careless operation. Three-fourths of these are the results of workmen dropping things on each others' feet, striking themselves and each other with hammers, and dropping things on each other from elevated positions. One-fourth of these are plate injuries, the result of allowing plates to slip while in the process of punching or bolting up. Twelve per cent are traceable to tripping and falling. Eight per cent are eye injuries, dirt, emery-scale in the eyes.

The United States Steel Corporation was one of the first industries to take up the matter of stopping this waste, and has probably gone further with it than any other organization. Its figures show a net saving of nearly $3,000,000 as a result of safety work in three years. This is simply the difference between what was spent in safety work and what accidents had previously cost. It does not take into account the great saving resulting from increased efficiency, as a result of improved and safer working conditions.

Time is money. Time saved is money saved. Bring it down to our own case for a moment, and figure in round numbers. Say about one-half of our men at the various yards lose one day in a year due to an accident. That means about 3,000 days lost time, or about 10 years working time. If you consider the fact that injuries lay men up from 10 days to many months, and in some cases cripple them for life, or kill them, instead of causing the loss of one day, you can see that the loss becomes enormous.

Do you know that even now in war-torn Europe, belts and pulleys and dangerous places in factories used in war production, are guarded? Not long ago there appeared in the pictorial section of one of the New York daily papers, a picture calling attention to this fact. Would any of the belligerents do this work in time of such stress if it did not pay?

The men at the head of our company have realized our needs in this connection and are going to take steps to improve these conditions, stop accidents and the resultant waste, and in this connection every man connected with the organization has his part to do.

Let each one think over the amount of work to be done in this line in our own organization, and each one do his part. We want help from all.

A thing to bear in mind is the fact that the workmen in each of your departments will reflect the attitude of their foreman and superintendent. They should realize that we are taking up a necessary part of an efficient organization, which has been neglected.

We are going to install for you in each department, a good steel bulletin board where there will be shown under glass, data and information with regard to accidents and accident prevention, together with such items of interest or information as may well be put before the men.

At each plant an organization will be made up of four general units:

1. A Plant Committee, with the plant superintendent at the head, will have supervision of the work.

2. A general inspector, who will attend to such duties as directed by the Plant Committee.

3. A Department Committee to be made up of not less than 3 men, chosen from various department superintendents and foremen.

4. A Workmen's Committee in each department will be made up of 3 workmen.

The members of these committees will be changed periodically.

The organizations at the various plants will all be brought together in a Central Committee made up of the presi-

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dent, the general manager, the auditor and the supervisor of safety.

Each of you think the matter over, get in mind your best men to be chosen for the first committee in your department, write down all the good ideas you get.

Think Safety! Talk Safety! and Live Safety!

The plant superintendent will soon form a temporary committee to help get things started.

Bear in mind that this is everybody's job!

Now, how good are we at our job? As we have already seen, we have great possibilities to work on. There is a possibility of preventing 8 per cent of our accidents by the proper use of goggles, 12 per cent by improving the condition of the floor and working places and 80 per cent by thinking about what we are doing and exercising an ordinary amount of care. What is your "batting average?" How near can we come to the top? Let us see how near we can develop 100 per cent efficiency along this line of Safety!

Prizes for May Articles

First Prize. No. 287. Richard B. Spreyer, New Haven, Conn.

Second Prize. No. 289. E. H. Hart, Safety Engineer, Ocean Accident & Guarantee Corporation, St. Louis, Mo.

Honorable Mention. Earl B. Morgan, Safety Engineer, Norton Company, Worcester, Mass.

Other meritorious articles were contributed by Neal Grant, Baltimore Copper Smelting & Refining Company, Baltimore, Md.; S. E. Richardson, Inspector, Pennsylvania Department of Labor & Industry, Pittsburgh, Pa.; Charles C. Black, Division of Compensation Inspection, Pennsylvania Department of Labor & Industry, Philadelphia, Pa.; L. A. DeBlois, Safety Engineer, E. I. duPont de Nemours & Co., Wilmington, Del.; J. A. Robertson, Manager, Camera Works, Eastman Kodak Company, Rochester, N. Y.; M. E. Arkills, Safety Engineer, The Pullman Company, Pullman, Ill.

Comments by Members of the Committee

I agree with the author of article 290. If you start giving bonuses it must be kept up or your men will lose interest. It is much better to keep them interested in safety work for their own protection and not for a prize they hope to receive.

❦ ❦ ❦

I vote for 289, but 285 is an excellent article for a safety campaign. It is the kind to set a careless person thinking.

A "Watcher" Step

I WAS walking with a boy in the country the other day when we came to a muddy place in an unfinished road.

"Here's a 'watcher'," he said, as he leaped across.

"What is a 'watcher'?" I asked, as I followed his example.

"A 'watcher' step," he explained, "A 'watch-your-step.' Whenever I come to a bad place where a fellow wants to keep his eyes open, I call it a 'watcher'."

This boy had discovered the important difference between a plain step and what he called a "watcher" or safety step. And what is the difference?

A plain step is a step which your legs can attend to. A "watcher" or safety step is a step which your mind must attend to. It should be a quick step, a firm step, a step that has been planned, that commands all your attention. For example. The step into a trolley car, or an elevated or subway train; the step into an elevator; the step from the curb into the gutter at any street crossing.

What other "watcher" or safety steps do you take every day?

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Sixth Annual Safety Congress

Its Sessions Will Deal with the Safety and Health of the Workers Under the Stress of War Conditions

By W. H. Cameron

General Manager, National Safety Council

PRIOR to the declaration by the United States of a state of war against Germany, the National Safety Council was busily preparing for the Sixth Annual Congress at New York City during the week of September 10.

Since then, our Country's participation in the conflict has necessarily caused great internal changes. Economy, efficiency and conservation are current watchwords.

The Executive Committee and Officers of the Council deliberated fully as to the propriety, or otherwise, of holding the Congress. They were in full sympathy with the need for economy, but at the same time recognized the advantages of a great Congress emphasizing the conservation of the life and health of the industrial army of the Nation.

At the May 19 meeting of the Executive Committee it was decided, as a measure of prudence, to canvass the entire membership of the Council, and secure the members' votes for or against it.

The votes in favor of the Congress were approximately 100 per cent in excess of those against it. This is unmistakable evidence that the majority of members wish the Congress to take place, that while they realize that conservation of human life and health in the industries is a fundamental necessity at all times, it is one of the Nation's greatest problems at this time. Five men will serve at home to every one at the front.

The Congress will accordingly be held as planned. In harmony with the times its sessions will deal with the safety and health of workers under the stress of war conditions.

Some of the National Safety Council members have not contented themselves by merely registering an affirmative vote, but have expressed in the strongest possible arguments the *unqualified necessity* for the Congress.

The following extracts from some of these letters are especially significant:

"Let me express my regret that consideration is being given to the possibility of abandoning the 1917 Congress, for the following reasons:

"1. This Nation is getting ready to mobilize itself in all ways, for a period of several years. Under methods of efficiency every ounce of the Nation's power is to be made to count for production and service in every sort of way—as well as in Army and Naval directions.

"2. The industries of the country are to be run at great capacity. Men now trained as useful workmen are not to be taken for military purposes. All this means that safety work, the prevention of industrial accidents, is and is to be of supreme importance during the progress of the war.

"3. To the casualties of war heavy casualties in the industries should not be added.

"4. If there ever was a time when all the means for preventing industrial accidents should be made known and applied it is NOW, in a period of stress and emergency.

"5. Moreover, I firmly believe that the authorities at Washington would unhesitatingly put themselves on record as urging the holding of the Safety Congress in 1917, as a service to the Nation.

"6. At the recent convention of the National Fire Protection Association, Secretary Redfield of the Department of Commerce attended to commend the work the association is doing and to urge intensified efforts from this time on. If that is the position of the Government toward fire prevention, that is also the position of the Government toward industrial accident prevention.

"7. To my way of thinking this is not a year for the National Safety Congress to obliterate itself nor to appear hesitant or doubtful before the people. Delegations of foremen should be sent to the congress by every important manufacturing establishment. A slogan to that effect would be a ringing inspiration for the Cause of Industrial Safety."

"We fail entirely to appreciate any cogent reason why the Congress should be relinquished. All arguments, in my opinion, are for the holding of it. The mobilization of American Industries for National Defense

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will require, in many instances, the employment of numerous unskilled workers; and if the war continues for any length of time thousands and hundreds of thousands of women will be employed. Is the National Safety Council to lie down without an effort to assist in solving the problem of added accident hazards which this condition will produce?"

"The National Council for Defense has gone on record as endorsing the Safety, Sanitation and Welfare Movement throughout our various industries; and even consider it a war measure, essential to victory. Saving of lives and limbs is of extreme importance at this period, even more than during ordinary times; and I doubt very much whether it would be good policy not to hold the Congress."

"My thought is that the present emergency more than ever before makes the Safety Movement one of the first activities to demand the best thought and concentrated efforts of those expert in the field. Nothing now can be more essential than the conservation of the life and health of the industrial workers of the country, and nothing could be of more telling assistance to this end than the Congress. To seek to maintain an unbroken line of industrial workers will doubtless be the keynote of the Congress; and this, as I see it, would represent a distinct service to the Nation."

"We have always claimed that safety was a good thing under all kinds of business conditions: good, bad or medium; and it is my very definite recommendation that we hold our Congress as planned."

"My view is rather well fixed: that it would be ill advised to discontinue active efforts on our own part in any one important direction on account of the war."

"I enclose a letter from Secretary of Commerce Redfield, from which you will see that he is in thorough accord with the necessity for safeguarding industrial workers, and that he himself will emphasize the importance of this as opportunity offers. Moreover, I am assured that the authorities at Washington are greatly in favor of having the big national meetings, conferences and congresses in every important line of business held this year without interruption. They seem to be particularly interested in interesting every industry in efficiency and economy of production, and in keeping down to a minimum the risks of accidents. As it is likely that many new employes, both men and women, are likely to be enlisted in industrial operations, safety work ranks almost No. 1 in importance."

Confident of the necessity for the Congress, and supported by the majority opinion of its members, the National Safety Council extends a hearty invitation to all interested in accident prevention work to attend the congress sessions, and help to fight the country's battles by discussing adequate safeguarding of the industrial armies at home.

Unique Bulletin Boards

THE Virginia Railway & Power Company, of Richmond, has devised an attractive and unique type of bulletin board designed to aid as much as possible the company's efforts to instill the safety idea in the minds of the employes. The bulletin board proper is 27 by 32 inches, with a hinged glass front, allowing the display of six 8½ by 11-inch bulletins at one time. The extension of the board, or table, has a top surface 29½ by 38 inches and stands 33½ inches from the floor. To the left end of the table is attached a box holding bulletins, also paper on which to write suggestions for the question box, which is also a part of the attached holder. On the top of the table is placed a large cloth-bound folder in which are kept the bulletins which were previously posted. These are for the benefit of new men who are constantly coming into the organization, and who may care to look them over.

The boards are of oak, constructed in the company's own shops, and cost about $20 each, including the folder for filing the old bulletins. The general safety committee has nearly 30 of these boards in use, placed in various car houses, shops, power houses and sub-stations, terminals and other places where men congregate. The boards may be termed the mouthpieces of the general safety committee organized last year to conduct a continuous campaign against carelessness and avoidable accidents.

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Community Health and Tuberculosis Conference Demonstration

By Lee K. Frankel, Ph.D.

Third Vice President, Metropolitan Life Insurance Company, New York

DURING 1915, 85,993 persons in the registration area died of tuberculosis of the lungs, 12,201 from other forms of tuberculosis—a total of 98,194. This indicates that in the country, as a whole, approximately 150,000 persons died from this disease alone. This cause of death represented 10.8 per cent of all deaths—more than one in every ten died from tuberculosis in some form.

These facts are of particular interest because it has been demonstrated that tuberculosis is curable and, in large measure, preventable. The large number of deaths from this cause is of importance to the community as a whole—because it is losing a large number of workers who are in the prime of life—as well as to the individuals who suffer from the disease. It is of particular interest to managers of industrial plants, because tuberculosis does not select its victims from those who are least efficient and of least value in industry. Its ravages affect all groups and classes.

During the last two decades large sums of money have been expended for the prevention and cure of tuberculosis. In spite of this fact the reduction in tuberculosis, although very marked, has not kept pace with the reduction in the death rate from a number of other diseases. This is particularly true of some infectious diseases.

Moreover, there are many problems that remain to be solved. The reduction in the death rate of tuberculosis has not been as uniform as might be expected. In a paper read by the author before the Mississippi Valley Conference on Tuberculosis in Indianapolis, September 30, 1915, entitled, "A Plea for a Federal Commission on Tuberculosis," it was pointed out that no adequate explanation had been developed for the surprising variation in the death rate, due to sex, age, occupation and locality.

The Framingham experiment is a direct outcome of that paper. In April, 1916, the board of directors of the Metropolitan Life Insurance Company offered to spend the sum of $100,000, through the National Association for the Study and Prevention of Tuberculosis, in a selected community; to determine, if possible, the contributory causes of tuberculosis and to develop a systematic and general method of prevention.

As announced in the papers and elsewhere, the Framingham Health and Tuberculosis Demonstration is being conducted under the supervision of a committee organized by the National Association for the Study and Prevention of Tuberculosis. On this committee are represented the National Tuberculosis Association, the Massachusetts State Department of Health, the United States Public Health Service, private anti-tuberculosis organizations in Massachusetts, Connecticut, New York and Pennsylvania, and the Metropolitan Life Insurance Company.

The selection of Framingham was made after several months' study of numerous communities of similar size in various parts of the United States, but particularly in Massachusetts and New York State. Framingham recommended itself to the committee because it possessed certain average qualities, being an industrial community, with mixed industries, varied racial groups, a good local health organization, backed up by an excellent State department of health, a normal amount of disease, particularly tuberculosis, well trained physicians and good hospitals, and sufficient promise of co-operation from medical, industrial, commercial and social organizations to give reasonable assurance of success.

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As indicated above, the objects of the investigation are to demonstrate what may be possible with united community action in the problem of prevention and control of tuberculosis. Inevitably, the experiment, if it goes forward as planned, will broaden out into a general health demonstration concerning itself with the various disease prevention problems as they affect the several age groups, utilizing in its effort at control all potential agencies, social, industrial, educational, medical, etc.

The present plan as outlined by the committee seeks to discover and place under adequate medical nursing and relief supervision, all cases of tuberculosis, whether incipient or advanced, in the community. The attempt will be made to ascertain with some degree of definiteness, the responsible social and economic effect in disease causation, including not only tuberculosis but all types of morbidity.

To date the community is being organized for active co-operation in the prevention of disease. A sickness survey of the community has been undertaken and an attempt is being made to secure a medical examination of all persons in the community.

If the results that are hoped for are secured through this experiment, community and individual well-being throughout the country should be markedly improved. If any methods for reducing the death rate from tuberculosis can be determined, it can be shown that these are applicable to other communities as well as Framingham and we may hope for increasing interest in public health activities in the United States.

Government Mine-Rescue Cars

SINCE 1910 the Bureau of Mines has been operating eight mine-rescue cars, each having headquarters in some one of the more important mining districts of the United States. The majority of these cars operate in coal-mining districts. Only one car, in fact, is operated in a metal-mining district exclusively; viz., in the Lake Superior iron and copper district. The cars were old Pullmans remodeled to meet the requirements of mine-rescue work.

Some time ago, Congress authorized the construction of additional all-steel cars for the mine-safety service of the Bureau of Mines. Three of these have just been delivered, and will take the place of three of the old cars which were condemned a short time ago as unfit for further use. The new cars will be located in the far west, with headquarters at Reno, Nev.; Raton, N. M.; and Butte, Mont., respectively.

It is to be especially noted that this marks the beginning of more extensive activities in metal-mining districts than it has been possible to undertake in the past.

The three cars are identical in construction. The floor plan consists of:

(A.) Demonstration room in which is stored all of the oxygen mine-rescue apparatus, first aid materials and accessories.

(B.) A corridor leading along one side of the car from the demonstration room to the rear end.

(C.) The first compartment off the corridor is the foreman's stateroom containing berths and lockers for four men.

(D.) The second compartment is the bath room, provided with toilet and bathing facilities, including a shower bath.

(E.) A third compartment is the engineer's office, in which are two desks and bookcases; berths and lockers for three men.

(F.) A fourth compartment consists of a dining room provided with linen closet, center table and chairs, etc. In one corner of the dining room is a typewriter desk where the clerk will make his office.

(G.) A fifth compartment consists of the cook's stateroom and separate toilet.

(H.) The sixth compartment is fitted up as an up-to-date car kitchen with range, ice chest, lockers, etc., with the regulation funnel arrangement and ex-

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haust fan in the roof for ventilation purposes. A double-coil Baker heater system is located in the kitchen end of the car.

The car is of all-steel construction. All compartments and the demonstration room are fitted with electric fans. The generating set is located in the demonstration room. In other words, the car provides its own light and heat. A feature is that a place has been provided in the car for every piece of apparatus.

The rescue apparatus consists of 10 sets of oxygen mine-rescue apparatus, oxygen pump and oxygen storage cylinders, mine-rescue lamps, and life lines, etc. The first aid equipment consists of first aid cabinets, bandages, splints, surgeon's emergency chest, stretchers, etc. To supplement the manual (Schaefer) system of resuscitation of those overcome by poisonous gases there is provided a simple mask with relief valve and connection for attachment to an oxygen bottle.

The engineer's equipment consists of every feasible device for examination of mines from a standpoint of sanitation, efficiency and safety, including Orsat apparatus for analyzing mine gases; vacuum air sample tubes; barometer; sling psychrometer; anamometer; surveying compass; Haldane air tester; ore and coal sampling outfits; camera, etc.

The cars are expected to operate 10 months out of each year.

The duty of the mining engineer is to arrange tentative itineraries of training through co-operation of the different parties concerned; to supervise the general operations of the car; to study the different safety, sanitary and efficiency features in the mines, and to act as a medium for transmission of new ideas pertaining to those features from one camp to another and from one State to another. The foreman miner is to instruct classes of miners in the use of the oxygen mine-rescue apparatus and mine-rescue and fire-fighting work in general. The first aid miner is to teach classes of miners in methods of first aid to the injured and methods of removing men injured in the mine to the surface. The clerk will take care of all the clerical and stenographic work on the car. The cook will care for the living quarters and obviously act as chef.

The hearty co-operation of mine officials, State mine inspectors, labor officials, and miners is hoped for by the Bureau of Mines. The car crews will endeavor to work harmoniously with every one concerned and help to propagate the "Safety First" movement in their respective districts. The methods of working out itineraries in the different districts will have to depend upon the district itself with due regard paid to the railroad facilities, season of the year, the wishes of the mine operator, etc.

The Reno car, to be known as Car No. 1 and which will make its headquarters on the University of Nevada campus at Reno, Nev., is manned by the following crew: Edward Steidle, mining engineer; J. V. Berry, foreman miner; Walter F. Pyne, first-aid miner; D. W. Cooke, clerk, and a cook.

The personnel of Car No. 2, with headquarters at Raton, N. M., is as follows: C. A. Herbert, mining engineer; K. H. Chisholm, foreman miner; Jas. Dalrymple, Jr., first-aid miner; A. F. Goldbloom, clerk.

The personnel of Car No. 5, to be located at Butte, Montana, is as follows: C. A. Allen, mining engineer; J. J. Forbes, foreman miner; S. C. Dickinson, first-aid miner; S. S. Blum, clerk.

At a later date, a mine surgeon will also be detailed for duty on each of the cars, his work to be carried on in co-operation with the Public Health Service.

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Safety News and Comment

***Editorial Note:** Safety Engineering invites its readers in all lines of industry to favor the Editor with copies of bulletins, items of safety news, figures showing reduction in the number of accidents as the result of the work of safety committees, etc.*

Navy Yards and Arsenals, Survey

THE United States Employes' Compensation Commission, composed of R. M. Little, Mrs. Frances C. Axtell and John J. Keegan, in co-operation with various departments, is conducting a safety survey of the navy yards, arsenals and other Government establishments where there is considerable industrial hazard.

The plan for the survey was worked out by the commission and the National Safety Council of Engineers, Lew R. Palmer, of Pennsylvania, president, having offered the services of that organization to the commission. The plan was submitted to the secretaries of the various departments and cordially approved by them. An advisory committee, representing the various departments, was organized to assist the commission in executing the plans. The National Safety Council delegated its field representative, C. W. Price, as director of the survey, with John S. Love, as his assistant. It also offered its individual services and the assistance of many other safety engineers in different parts of the country.

There are several reasons for making the survey. The compensation commission is just beginning its work and desires to ascertain the conditions under which civil employes labor, in order to administer the compensation act intelligently, and, if possible, to reduce the number of accidents and personal injuries. Because of the war, most of the navy yards and arsenals are under high pressure, enlarging their facilities and increasing the number of employes, consequently increasing the hazards of employment. The compensation commission believes that prevention of personal injuries is the best compensation civil employes can receive. The officers in charge of Government establishments recognize that prevention is a part of good business management. The aim is to make the Government establishments model places of employment. A Committee on Standards has been organized by the National Council and is composed of the following:

Chairman, Lew R. Palmer, Department of Labor & Industry, Pennsylvania; vice-chairman, Dr. Lucian W. Chaney, United States Department of Labor, Washington; D. S. Beyer, Massachusetts Employes' Insurance Association, Boston; W. J. Canada, United States Bureau of Standards, Washington; A. H. Young, American Museum of Safety, New York; H. W. Forster, Independence Inspection Bureau, Philadelphia; Carl M. Hansen, National Manufacturers' Association, Huntingdon; H. A. Schultz, United States Steel Company, Pittsburgh; W. P. Eales, Travelers' Insurance Company, Hartford; R. J. Young, Chicago; J. R. Brownell, California.

The commandants and officers of the establishments are heartily co-operating with the field director and his assistants in the work of the survey. Safety committees will be organized to carry on educational work and to inspire the workmen themselves with the idea of safety.

National Safety Council

IT is well to reiterate frequently that the fundamental basis of accident prevention is co-operation. Safety work involves no bugbear of trade secrets, unfriendly competition or petty jealousies. It is symbolic of the free interchange of ideas, and as a means of resolving individual experience into that of the mass of collective experience. No one can be "self-sufficient" in safety work, because nobody has a monopoly of experience and ideas.

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These considerations justify the centralizing of the country's collective accident prevention experience in one organization. Given efficient means to receive that data; appropriate machinery for classifying and distributing it, and ability to create and plan, it follows that such a clearing house is not only the most economical means of spreading the safety gospel, but also the most efficient and the most satisfactory.

The brief history of the National Safety Council fully justifies its formation. That its membership has increased from 40 to 3,142 in three and a half years proves that the doctrine of co-operation is spreading. In the maintenance of its service to members, men over all the country collaborate: the council is essentially a democracy. That service, which initially consisted of a few simple bulletins, has so developed that these bulletins are now but a part—although necessarily an important one—of the whole.

The analysis of a typical month's activities at the council's headquarters should prove interesting to our readers. April, 1917, will serve as an example:

1. It secured 154 new members in April, a daily average of 6;

2. Its information bureau answered 159 separate inquiries from members on diversified aspects of the accident prevention problem;

3. Three thousand six hundred and eighty-five first and follow-up letters were sent to prospective members;

4. Motion pictures or lantern slides were loaned to 51 members;

5. Fifteen different bulletin board and 5 service series bulletins were distributed to members;

6. It issued two news letters to all members;

7. It issued sectional bulletins to its iron and steel; electric railway; foundry and railroad members, besides special data to members of these sections;

8. It sent to all its mining members an analyzed classification of 84 fatal mine accidents in one State, to serve as a guide against predisposing causes which might cause like accidents at these members' mines;

9. It sent its chemical members a proposed uniform schedule for classifying accidents in that industry;

10. It sent to all its iron and steel members a special sectional news-letter;

11. It followed up the activities of all its local councils and sections; sent its monthly letter on membership-procuration to officers of local councils and sections; and its first monthly news-letter to all local council officers. This letter gave each local council the benefit of workable plans and ideas evolved by the rest.

The participation of the United States in the War has given the National Safety Council an opportunity to cooperate with the Council for National Defense. L. R. Palmer, president of the National Safety Council, has been appointed by Samuel Gompers as chairman of the Special Committee on Safety Devices and Safety Activities. Field Secretary Price has temporarily severed his connection with the National Safety Council, in order to superintend a comprehensive safety survey of governmental establishments.

The recently organized Texas Safety Council held a successful first annual meeting at Houston on May 14 and 15. Local councils have been organized at Dallas and Houston.

The former Pittsburgh Local Council has been reorganized as the Western Pennsylvania Safety Council. A new district local, the Lackawanna Country, has been established in Scranton. A new local is also active in Everett, Washington. Others at Nashville, Tenn., and Birmingham, Ala., are in prospect.

A new and revised edition of the council's popular pamphlet "Safety Slogans" has been distributed to members. The monthly "Safe Practices" leaflets already issued are "Ladders"; "Boiler Rooms"; "Stairs and Stairways"; "Crane Construction and Safe Practices," and "Belt Shifters and Shippers." The next in series, "Belts and Belt Guards" and "Shafting and Mill Gearing," are in course of preparation. The initial draft of these pamphlets (which have been enthusiastically received by members) is revised by a committee of 50 safety engineers, and the final touches applied by an advisory committee of 5.

All the council's general bulletins now

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come in two colors. This means greatly increased cost, but the bettered display and attractiveness justify the increased outlay.

A special "Safe Practices" leaflet on "School Safety Work" has been issued.

Sectional committees of the National council have held meetings to foment their special activities.

The "pros" and "cons" of holding the 1917 Congress at a time when the country is at war have been submitted to the council's entire membership for a mail vote, and the final decision will be taken by the Executive Committee at its June 19 meeting.

Now as never before is the time when the safety engineer can be more helpful to his country by promoting to the very limit of his strength and enthusiasm the work of which he has charge. Saving men at home means saving men at the front.

Laboratories' Electrical Council

THE second meeting of the newly organized Electrical Council of Underwriters' Laboratories was held at Chicago, May 23 and 24.

The meeting was of particular interest and importance in that it was the first business session of this council, and a lively interest was manifested by the members in the discussions of the scope of its work and the methods of procedure to be followed and the results to be aimed at both in the elaboration of standards for the construction of tests of electrical appliances and in the regular work of examining and testing appliances under such standards.

Action on new subjects included the following: An extension was made to the existing standards on metal molding to include surface metal raceways of one-piece design for use on two-wire circuits not exceeding 1,320 watts capacity. Under this extension the new surface wiring raceway known by the trade name of "Wiremold" was listed as standard.

On the subject of fuses action was taken directing that the staff engineers undertake an investigation with the view to reporting to the Electrical Council for consideration at a future date, suggestions for a possible set of specifications, method of testing, supervision, and field follow-up of the details of design, construction and performance under test of so-called refillable fuses.

W. J. Canada of the Bureau of Standards and H. H. Clark of the Bureau of Mines of the Federal Government, made interesting statements concerning the present tendencies in the construction of electrical devices from the viewpoint of accident hazards. A resolution was adopted calling to the attention of manufacturers the desirability of paying more attention to these features in the design and construction of appliances.

The newly developed standard on armored cables was formally adopted. Other subjects of discussion included construction and use of miniature motion picture machines and their special films, electrical heaters and pressing irons, ground clamps, bell-ringing transformers, and disconnecting plugs or receptacles of large capacity for battery charging circuits and similar uses.

Red Cross Needs $100,000,000

THE week ending June 25 was officially proclaimed by President Wilson as "Red Cross Week," during which "the people of the United States will be called upon to give and give generously and in a spirit of patriotic sacrifice for the support and maintenance of this work of national need."

Henry P. Davison, chairman of the recently appointed Red Cross War Council, in an address to the delegates from American Red Cross chapters assembled in Washington late in May, told of the need of the society for $100,000,000 to carry on its great work. Mr. Davison spoke of the obligation and privilege in caring not only for our own army but also of the sore need of the Allied countries in Europe. The Russian line of 1,000 miles is said to have only 6,000 ambulances, while on the French front of 400 miles there are 64,000 fully equipped ambulances.

Mr. Davison has supplemented his ad-

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dress with a circular letter to the press in which he says:

"Our Army and Navy represent the will of the American people; our Red Cross represents the American heart. Our duty is primarily to relieve suffering and restore to health and strength the sick and wounded; that is a vital part in winning this war.

"We need and beg your earnest cooperation. We want our Red Cross to respond nobly and trenendously to this supreme call to the American people for service and sacrifice."

Following the example of the United States Steel Corporation which, on June 12, declared a "Red Cross" dividend of $1 a share, the du Pont Powder Company and a number of other great corporations declared extra dividends. While these special dividends become the property of the stockholders who are not obligated to send them to the Red Cross, it is safe to say that few, if any, of the shareholders will fail to turn the money over to aid this world wide necessity for alleviating suffering.

Statistical Work for Country.

IN anticipation of the social and economic problems likely to result from the German-American War, the National Council of Defense, through its Advisory Commission on Labor and Welfare—Samuel Gompers, chairman—has appointed Dr. Frederick L. Hoffman, statistician of The Prudential Insurance Company of America, as chairman of the National Committee on Statistics and Information. The Prudential has offered the resources of its statistical department to the advisory commission, and sub-committees will shortly be organized in anticipation of the demand for trustworthy statistical and other information required by the national committees on wages and hours, women in industry, mediation and conciliation, industrial accident-prevention, etc. The plan is to inaugurate at once a national statistical service, whereby the the state of the nation regarding health, physical and social wellbeing, sickness and accidents in industry, unemployment, etc., may be presented with scientific conclusiveness from week to week, for the information of the National Council of Defense and the public at large.

Compulsory Health Insurance

RESOLUTION adopted by the Section on Preventive Medicine and Public Health, of the American Medical Association, June 6, 1917:

Resolved, That after full discussion and careful consideration of the subject, the Section on Preventive Medicine and Public Health of the American Medical Association hereby instructs its Delegate to the House of Delegates of the American Medical Association to oppose the scheme for Compulsory Health Insurance in every way possible.

Fire Chief Fears for Los Angeles

FIRE CHIEF SLY of Los Angeles says in reference to the danger of a serious fire in that city: "Los Angeles faces a conflagration that may lay waste millions of dollars' worth of property, for we have not the apparatus with which to fight two big fires simultaneously. The reason for this condition of affairs is that our city council has failed to pass laws providing fire prevention measures and the physical condition of the fire department has been kept down by niggardly financial allowances."

Open Lamp Cost 120 Lives.

A CORONER'S jury brought in the verdict that an open safety lamp caused the explosion on April 27 in the Hastings mine of the Victor-American Fuel Company, near Trinidad, Colo. One hundred and twenty men lost their lives in this casualty.

Scufflers Are Hurt Daily

A MAN was injured not long ago in a mid-western industrial plant. He was scuffling with a fellow employe, was thrown off his balance, and struck his head on a piece of metal. Probably you remember that this accident happened in your plant not long ago. It is one of the commonest sources of accidents.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

CHEMICAL AND PHARMACEUTICAL WORKS

April 2, 1917. White Haven, Pa. Luzerne Ochre Manufacturing Company. Moosehead, about 6 miles from White Haven. Manufacturing dry pigments. Four 1- and 2-story buildings destroyed. Walls, frame. Floors, wood. Roof, slate and metal. Cause, unknown. Discovered by seeing the flames about 10 p. m. No fire department. Duration, 2½ hours. Stopped when everything was consumed. Fire was favored by frame construction. Private fire apparatus, few extinguishers and water pails. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, about $20,000. Property loss, about $12,000.

April 15, 1917. Albany, N. Y. Albany Chemical Company. Van Rensselaer Island, Bethlehem township. Chemical works. One 1-story building partially destroyed. Walls, brick. Floors, earth. Roofs, slag. Cause, unknown. Discovered by some person on the island. Alarm, telephone message from manager asking for help. Duration, about 1 hour. Fire was outside city of Albany. Chief sent one engine company which prevented the spread of the fire. Private fire apparatus, private water service. Property loss, $20,000.

CHURCHES

March 28, 1917. Chicago, Ill. St. Catharine of Siena Catholic Church. Lakeside avenue and Washington boulevard. One 2-story building destroyed. Walls, stone, 1st story; 2nd story frame. Floors, wood. Roofs, wood shingles. Cause, sparks from chimney. Fire started in roof. Discovered by still alarm to fire alarm office about 7:44 p. m. Alarm, from fire alarm office. Duration, 3 hours. Stopped in building. Fire was favored by wood construction and shingle roof. Persons in building, none. Means of escape, 3 entrances. Value of building and contents, $13,000.

March 31, 1917. Des Moines, Iowa. Grace Methodist Episcopal Church. W. 19th and Crocker streets. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown—possibly defective electric wiring. Fire started in the attic. Discovered by minister in his study in the church about 3 p. m. Alarm, telephone. Duration, 2 hours. Confined to roof over main auditorium. Fire was favored. Building all under one roof with no fire stops and no brick partition walls. Persons in building, 1. Means of escape, ordinary exits (3). Value of building and contents, $58,000. Property loss, $15,225.

April 15, 1917. Sharon, Pa. Methodist church. Boyce and N. Main streets. One 2-story building with 120-foot steeple. Walls, wood. Floors, wood. Roofs, slate. Cause, overheated furnace. Discovered by passerby about 8:20 a. m. Alarm, telephone. Duration, 3 hours. Stopped in building where it started. Fire was favored by wood construction. Firemen handicapped by headway of fire before alarm was given. Private fire apparatus, extinguishers and private garden hose. Persons in building, none. Injured, 3 volunteer firefighters. Means of escape, usual exits. Value of building and contents, $40,000. Property loss, total.

CLOTHING FACTORIES

April 5, 1917. St. Paul, Minn. Paris Ladies' Hat Manufacturing Company. 369-373 Jackson street. Manufacturing ladies' hats. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started in 2nd story. Discovered by patrolman about 11:17 p. m. Alarm, box. Duration, 2½ hours. Stopped in same building. Fire was favored by contents of building, hat trimmings, etc., all fine light goods which burned like tinder. Firemen handicapped slightly by dense smoke in rear alley. Persons in building, none. Means of escape, fire escape in rear. Value of building and contents, $12,000 to $15,000. Property loss, total.

COAL AND LUMBER YARDS

March 27, 1917. Versailles, Ky. Chenault & Eades. Lumber yard. Two 1-story build-

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ings destroyed. Walls, wood. Floors, wood. Roofs, wood and paper. Cause, unknown. Fire started in sawmill. Discovered by workman about 12:30 p. m. Alarm, telephone and fire bell. Duration, 7 hours. Stopped at extreme end of yard. Fire was favored by inflammable construction. Persons in building, 1. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $22,300. Property loss, about $18,440.

DEPARTMENT STORES

March 21, 1917. Cisco, Tex. George D. Fee & Co. Avenue D. Dry goods and shoes. One 1-story building damaged. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, uncertain; supposedly cigarette or cigar stub. Fire started under counter near shoe stock. Discovered by seeing flames from street about 7 p. m. Store had been closed 10 minutes previously. Alarm, telephone. Duration, 30 minutes. Stopped in shoe stock. Fire was somewhat retarded by metal ceiling. Firemen handicapped by smoke; some delay in finding exact location of fire. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, $25,000. Property loss, $5,000.

DWELLINGS, ORDINARY COUNTRY

April 8, 1917. Oyster Bay, L. I., N. Y. G. T. Maxwell. West of Cove Neck road. "Wake Robin"—summer home. One 2-story dwelling destroyed. Walls, frame. Floors, wood. Roofs, shingles. Cause, unknown. Fire started apparently in southeast corner of 2nd story. Discovered by superintendent of estate about 6 a. m. Alarm, telephone. Duration, about 5 hours. Stopped at northeast corner of building—complete loss. Fire was favored by wood construction and location of house on hill. Firemen handicapped by having no water available within half a mile. Private fire apparatus, 2 hand extinguishers. Persons in building, 4 in basement. Means of escape, stairways. Value of building and contents, $80,000 to $100,000. Property loss, total.

ELECTRIC LIGHT AND POWER STATIONS

March 31, 1917. Decatur, Ind. Fort Wayne & Decatur Interurban Railway. Electric power plant. One 1-story building destroyed. Walls, cement blocks. Floors, wood. Roofs, tar paper. Cause, lightning. Fire started in electric generator about 11 a. m. Alarm, telephone. Duration, 2 hours. Firemen handicapped by delay in returning to station for additional hose as fire plug was some distance from fire. Persons in building, 3. Means of escape, not reported; 1-story building. Value of building and contents estimated at $40,000.

EXPOSITION AND FAIR BUILDINGS

January 9, 1917. Minneapolis, Minn. Northwestern Furniture & Stove Manufacturers' Exposition Co. Raymond and University ave. Furniture and stove exposition. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, gravel. Cause, unknown. Fire started in rear elevator shaft. Discovered by passerby about 7:19 p. m. Alarm, box. Duration, about 5 hours. Stopped in same building. Fire was favored by open wood construction; few partitions which were also of wood. Persons in building, none. Injured, 1. Means of escape, inside stairway. Value of building and contents, $150,000. Property loss, $140,000.

CONFLAGRATIONS

March 26, 1917. Fremont, Ohio. H. Hollinger. Rear of 928 Croghan street. Barn. One 2-story building destroyed; 11 others scorched. Walls, wood. Floors, wood. Roofs, shingle. Cause, burning rubbish. Fire started inside the barn. Discovered by a neighbor about 10:30 a. m. Alarm, telephone. Duration, 1 hour, 40 minutes. Stopped when barn was consumed. Fire was favored by light frame construction. Persons in building, none. Property loss, nominal.

April 5, 1917. Lapeer, Mich. Various buildings. Main street. Two hardware stores and clothing store. Hardware stores burned; falling walls destroyed other building. One 1-story and two 3-story buildings destroyed. Walls, brick. Floors, wood. Roofs, wood, asphalt and asbestos. Cause, unknown. Fire started in basement of hardware store. Discovered by seeing smoke pouring from building about 6:35 p. m. Alarm, telephone. Duration, 14 hours. Stopped at front of hardware store. Fire was favored by wood partitions and large openings. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $45,000.

April 5, 1917. Clarksville, Tenn. Various buildings. Spring and College streets. Tobacco factory (2 buildings), grain and feed store and 3 dwellings. Six buildings—1 to 4 stories—destroyed. Walls, brick and wood. Floors, wood. Roofs, tin. Cause, unknown. Fire started in office of tobacco factory. Discovered by watchman at another factory about 4:45 a. m. Alarm, telephone. Duration, department pumped for 5 hours; 3 streams playing for 4 days. Stopped at R. R. freight depot. Fire was favored by 60-mile gale, close proximity of buildings and 1 wooden building which burned. Firemen handicapped by high wind and distance of fire plugs. Private fire apparatus, hand extinguishers. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $400,000. Property loss, $50,000.

FLOUR AND CEREAL MILLS

April 17, 1917. Des Moines, Iowa. Bast-Fogarty Company. Mulberry and W. 15th streets. Flour mill. One 1- and 2-story building partially destroyed; also 75-foot elevator. Walls, wood and brick. Floors, wood. Roofs, gravel. Cause, unknown. Discovered by employes about 8:45 p. m. Alarm, telephone

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Duration, 4 hours; confined to main building. Persons in building, 24. Means of escape, doors. Value of building and contents, $125,000. Property loss, $67,000.

GARAGES AND AUTO REPAIR SHOPS

March 17, 1917. Upland, Cal. R. L. Creighton. Main street. Garage, motorcycles and bicycles. One 1-story building partially destroyed. Walls, brick. Floors, concrete. Roofs, composition roofing; flat. Cause, gasoline on floor and careless smoker. Fire started in center of building. Discovered by night man about 7:40 p. m. Alarm, telephone. Duration, 4 hours; confined to main building. Persons in building, 24. Means of escape, doors. Value of building and contents, $125,000. Property loss, $67,000.

GAS WORKS

April 2, 1917. Fayetteville, N. C. Fayetteville Light & Power Company. Near Atlantic Coast Line Ry. Gas plant. One 1-story building damaged. Walls, brick. Floors, earth. Roofs, tin. Cause, unknown. Fire started in meter room. Discovered by an operator about noon. Alarm, telephone. Duration, 30 minutes. Confined to meter room. Fire was favored. Department had to lay 1,000 feet of hose, but fire was soon under control after this was of building and contents, $8,000. Property loss, $4,500.

Ruins of the Llewellyn Iron Works, Los Angeles, Cal., after the fire on December 16, 1916. The building, which was old and dry, was of brick, frame and galvanized iron. The fire, cause unknown, originated in the office and was discovered from an explosion about 2.40 a.m. Exits were ample for the 100 or more employes in the building. Loss, about $200,000.

Duration, 45 minutes. Stopped short distance from where it started. Fire was retarded by substantial construction. If ceiling had been of metal, very little damage could have resulted. Private fire apparatus, few Pyrene extinguishers. Persons in building, 3. Means of escape, usual entrances. Value of building and contents, $32,000. Property loss, $15,000.

April 3, 1917. Mt. Gilead, Ohio. Ireland Brothers. 8 W. High street. Garage. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, metal. Cause, explosion. Fire started in front of garage. Discovered by noise of explosion. Alarm, telephone. Duration, 30 minutes. Private fire apparatus, hose. Persons in building, 3 or 4. Injured, 1. Means of escape, ample. Value done. Persons in building, not reported to SAFETY ENGINEERING. Means of escape, ample. Value of building and contents, $8,000 to $10,000. Property loss, nominal.

GENERAL STORES

March 20, 1917. Bowerston, Ohio. J. N. Dunlap. Main street. General merchandise. Eight 2-story buildings destroyed; store building and 7 stables. Walls, wood. Floors, wood. Roofs, galvanized iron. Cause, unknown. Fire started in wareroom. Discovered by neighbor who was awakened by light about 1:45 a. m. Alarm, telephone. Duration, 1 hour, 45 minutes. Stopped in same block. Fire was favored by wood construction. Persons in building, 6. Means of escape, not re-

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ported to SAFETY ENGINEERING. Value of buildings and contents, $20,000. Property loss, $8,200.

GRAIN ELEVATORS

March 27, 1917. Celina, Ohio. Palmer Miller Grain Company. West Logan street. Grain elevator. One building destroyed; 1-, 2- and 3-story. Walls, wood covered with tin. Floors, wood. Roofs, tin. Cause, defective wiring. Fire started in flour storeroom. Discovered by passerby about 12:30 a. m. Alarm, telephone. Duration, 6 hours. Stopped under grain. Fire was retarded by tin roof. Firemen handicapped by insufficient water pressure. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, approximately $43,000. Property loss, $15,000.

HOSPITALS AND SANITARIUMS

March 15, 1917. Geneva, N. Y. Willard State Hospital. Willard State Hospital grounds. Dormitory for convalescent patients. One 1-story building slightly damaged. Walls, brick. Floors, oak. Roofs, cable, slate-covered, open ceilings. Cause, unknown. Fire started in coal bin in basement. Discovered by night watchman about 4:15 a. m. Alarm, fire alarm whistle on electric plant. Duration, 1 hour, 30 minutes. Stopped within 20 feet of starting point. Fire was retarded at point of origin; stone partitions in basement. Firemen handicapped by dense smoke from smoldering coal. Private fire apparatus, hospital's own well-equipped fire department only one used. Persons in building, about 225. Means of escape, ample exits on all sides of building. Property loss, nominal.

HOTELS AND LODGING HOUSES

April 16, 1917. Gloversville, N. Y. Hammond Hotel. Mayfield road, 2 miles from Gloversville. Two 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Discovered by a neighbor. Fire was outside city limits and department did not respond. Fire was favored by flimsy construction. Persons in building, 1. Killed, 1. Means of escape not reported to SAFETY ENGINEERING.

LAUNDRIES

March 25, 1917. Joliet, Ill. Columbia Laundry building. 115-17 Van Buren street. Laundry, hall and skating rink. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Discovered by policeman about 3:50 a. m. Alarm, given by policeman. Duration, 6 hours. Stopped in same building. Fire was favored by inflammable construction. Persons in building, none. Means of escape, iron fire escape. Value of building and contents, $30,000. Property loss, total.

MANUFACTORIES, MISCELLANEOUS

March 15, 1917. Spokane, Wash. Gray Manufacturing Co. 1102 Ide avenue. Wholesale grocery and soda fountain supplies, etc One 3-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started in basement. Discovered by citizen about 11:40 p. m. Alarm, box. Duration, 3 hours. Stopped at roof. Fire was favored by open elevator shaft which spread fire to all floors and the roof. Persons in building, none. Means of escape not reported to SAFETY ENGINEERING. Value of building and contents, $100,000. Property loss, $55,000.

March 22, 1917. Camden, Ark. Rockwell Manufacturing Co. Breckenridge and Phillipps streets. Manufacturing screen doors. Three 1-story buildings destroyed. Walls, wood. Floors, wood. Roofs, composition. Cause, unknown. Fire started in varnish room. Discovered by watchman about 3:30 a. m. Alarm, telephone. Duration, 3 hours. Stopped at office. Fire was favored by wood construction. Firemen handicapped by too many hydrants for size of water main. Private fire apparatus, 500 feet 2½-inch hose. Persons in building, none. Means of escape, none; 1-story buildings only. Value of buildings and contents, $250,000. Property loss $200,000.

March 24, 1917. Akron, Ohio. Giant Tire & Rubber Company. 30 E. North street. Manufacturing rubber. One 2-story building damaged. Walls, brick. Floors, wood. Roofs, galvanized iron. Cause, rosin boiled over on stove. Fire started on stove in 1st story about 12:36 p. m. Alarm, telephone. Duration, 5 hours. Stopped in pile of old tire beads beside building. Persons in building, no record. Injured, 1. Means of escape, doors and windows. Value of building and contents, $150.000. Property loss, $5,750.

March 30, 1917. Ford City, Ont. Chalmers Motor Company. St. Luke road. Manufacturing automobiles. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, tar paper. Cause, unknown. Fire started in paint department. Discovered by office employes about 10:10 p. m. Alarm, telephone. Duration, 7 hours. Stopped at office which was only part of building saved. Fire was favored by wood partitions. Private fire apparatus, that of the Fisher Body Company, next to the Chalmers plant. Persons in building, 4. Means of escapes, stairways. Value of building and contents, $325,000.

MERCANTILES, MISCELLANEOUS

March 24, 1917. Cabool, Mo. First National Bank building. Main street. Bank, restaurant and drugstore. One 1-story and one 2-story building destroyed. Walls, wood and concrete. Floors, wood and concrete. Roofs, shingle and ruberoid. Cause, unknown. Fire started in restaurant. Discovered by watchman about 3 a. m. No fire department. Duration, 2 hours. Stopped when buildings were consumed. Fire was retarded by substantial construction. Persons in building, none. Means of escape, not reported to SAFETY ENGINEERING. Value of buildings and contents, $15,000. Property loss, total.

April 16, 1917. Long Beach, L. I., N. Y.

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Thomas Healy. Boardwalk. Restaurant. One 3-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in center of building. Discovered by police about 11:10 p. m. Alarm, telephone. Duration, 4 hours. Stopped when building was consumed. Fire was favored by wood construction. Private fire apparatus, Long Beach fire department. Persons in building, 18. Injured, 2. Means of escape, windows. Value of building and contents, about $75,000. Property loss, total.

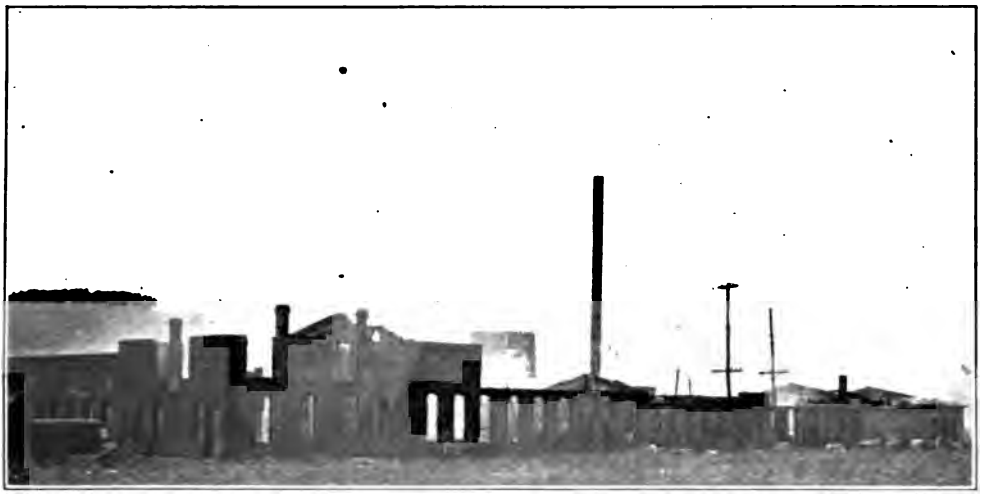
MERCANTILES, TENANT BUILDINGS

March 19, 1917. Southbridge, Mass. Business building. Elm street. Bakery in basement, grocery and tenements. One 1½-story building damaged. Walls, wood. Floors, wood. Roofs, part slate, part tar and gravel. Cause, overheated stovepipe. Fire started in bakery. Discovered by passerby who saw smoke about 9:30 p. m. Alarm, telephone. Duration, 4 hours. Stopped at roof. Fire was favored by old construction with no stops between floors. Firemen handicapped by extreme cold and ice. Private fire apparatus, hand extinguishers. Persons in building, 10. Means of escape, stairway. Value of building and contents, $8,000. Property loss, $3,800.

April 6, 1917. Pawtucket, R. I. Taylor block. Grocery and market, clothing, fruit store and restaurant. One 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tar and gravel. Cause, unknown. Fire started in basement. Discovered by baker working in 4th story about 8:10 p. m. Alarm, box, Gamewell system. Duration, 15 hours. Firemen handicapped by ammonia fumes and a metallic ceiling. Persons in building, 1. Injured, 1 fireman cut by glass; 5 overcome by smoke. Means of escape, not reported. Value of building and contents, $236,800. Property loss, $112,000.

METAL WORKERS

April 5, 1917. Batavia, N. Y. Batavia Clamp Company. Rear of 35 Center street. One 1-story building damaged. Walls, wood. Floors, wood. Roofs, tar paper. Cause, explosion of japanning mixture. Fire started in blacksmith shop. Discovered by workman about 9:15 a. m. Alarm, telephone and box. Duration, 30 minutes. Fire was favored by open construction—no partitions. Persons in building, 3. Means of escape, 1-story building only.



Plant of the Rex File & Saw Company, Newcomerstown, Ohio, after its $100,000 fire of April 12. Fire, which started in the hardening room, was caused by the blowing off of the stem to air and oil mixture, as it was being turned on. The department was handicapped in fighting the fire by lack of sufficient hose, and by the bursting of 4 sections of old hose.

April 12, 1917. Newcomerstown, Ohio. Rex File & Saw Company. Manufacturing files and saws. One 1- and 2-story building destroyed. Walls, brick and cement block. Roofs, slate and tar paper. Cause, air and oil mixture stem blew off while being turned on to "full." Fire started in hardening room. Discovered by employe in hardening room about 5:50 p. m. Alarm, bell and fire whistle Duration, 1 hour. Stopped at blacksmith shop Fire was retarded by brick walls. Firemen handicapped by insufficient hose at first call; 1,200 feet required to reach building. Four sections of old hose burst. Private fire apparatus, few extinguishers. Persons in building, 2. Means of escape, doors. Value of building and contents, approximately $150,000. Property loss, approximately $100,000.

April 13, 1917. Sharon, Pa. Sharon Hardware Manufacturing Company. Taloc and E.

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Weller streets. Manufacturing builders' hardware supplies. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roofs, wood and tar paper. Cause, dropping lighted match in lacquer room. Fire started in lacquer room. Discovered by person who dropped the match about 4:25 p. m. Alarm, telephone. Duration, 10 hours. Stopped in 2nd story. Fire was favored by absence of partitions in 2nd story. Firemen handicapped by shortage of men. Private fire apparatus, 3-gallon chemicals. Persons in building, 150. Means of escape, stairways. Value of building and contents, $120,000. Property loss, $57,000.

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City Hall, New York City. Fire on May 10, supposed to have originated from defective insulation of electric wires, caused about $25,000 damage to the cupola of this historic building. Valuable paintings and furnishings in the Governor's room, and those occupied by the Art Commission, were badly damaged by smoke and water.

MISCELLANEOUS

April 4, 1917. Jersey City, N. J. Detwiller & Street Fireworks Manufacturing Co. Foot of Woodlawn avenue. Manufacturing primers for Russian government. One 2-story building slightly damaged. Walls, frame. Floors, wood. Roofs, slag. Cause, friction, so far as can be ascertained. Fire started in room where primers were being filled with black powder. Discovered by flaring of powder about 4:21 p. m. Duration, 10 minutes. Stopped in same room where it started. Fire merely blackened table on which was 1½ pounds black powder to fill the primer caps. Private fire apparatus, 4 lines of hose stretched and attached to hydrants. Fire was out when department arrived. Persons in building, 56. Killed 9. Injured, 19 burned. Means of escape, numerous exits and outside stairways;

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no fire escapes. Property loss, trifling. On the insistence of the fire chief, 4 lines of hose were attached to hydrants in the yard of the plant and lined into the building with a man assigned to turn on the water in case of a fire. This was the means of saving the building, as fire was extinguished in a very few minutes.

OFFICE BUILDINGS

March 26, 1917. Bristol, Tenn. Mahoney office building. Sixth and State streets. Stores on ground floor, offices above. One 3-story building damaged. Walls, brick. Floors, wood, double thickness. Roofs, metal. Cause, unknown. Fire started on ground floor. Discovered by policemen about 12:45 a. m. Alarm, telephone. Duration, 5 hours. Stopped at 3rd story. Fire was favored by plaster and wood partitions. Firemen handicapped by dense smoke; impossible to locate fire for half an hour. Persons in building, 6. Injured, 3 slightly in sliding down ropes. Means of escape, ordinary doors and windows only. property loss, about $40,000.

OIL WORKS AND TANKS

March 31, 1917. Philadelphia, Pa. India Refining Company. Swanson and McKean streets. Oil refinery. One 2-story building destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started in cellar about 4:30 (?). Alarm, telephone and telegraph. Duration, about 15 hours. Stopped in same building. Fire was favored by open stairway and elevator shaft, and the oily nature of the interior. Private fire apparatus, adjoining plant had hose and fire pumps. Persons in building, not reported. Means of escape, stairway.

PAINT AND VARNISH WORKS

March 23, 1917. Cincinnati, Ohio. Richmond Brothers. 117 E. Sixth street. Manufacturing paint and varnish. One 5-story building destroyed. Walls, brick. Floors, wood. Roofs, composition. Cause, defective wiring. Fire started in packing room in 3rd story. Discovered by employes and auxiliary alarm about 2:35 p. m. Alarm, box. Duration, about 17 hours. Stopped in same building. Fire was favored by inflammable construction. Firemen handicapped by tardy alarm; auxiliary box was out of order and alarm was not received until fire was beyond control. Private fire apparatus, ten 3-gallon extinguishers. Persons in building, 12. Means of escape, inside stairway and front fire escape. Value of building and contents, $38,000. Property loss, $34,000.

PAPER AND PULP MILLS

March 27, 1917. Norfolk, N. Y. Remington Paper & Pulp Company. Also car barn of Norwood & St. Lawrence R. R. Company. Two buildings destroyed—sawmill and car-barn; also 10,000 cords of wood belonging to paper mill. Walls, wood. Floors, wood and concrete. Roofs, metal. Cause, unknown. Fire started in wood pile. Discovered by employes about 9:30 a. m. Alarm, whistle on mill. Duration, about 20 hours. Stopped in wood pile. Fire was retarded by substantial construction of car barn which had fireproof roof and concrete floors. Firemen handicapped by bursting of water main. Private fire apparatus, 2 chemicals, hand pump and hook and ladder truck. Persons in buildings, not reported. Means of escape, not reported. Property loss, $125,000.

PAPER WORKERS

April 6, 1917. Laconia, N. H. Tetley box shop. Manufacturing paper boxes. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, paper. Cause, unknown. Fire started in center of building. Discovered by flames breaking through roof about 10 p. m. Alarm, box. Duration, 2 hours. Stopped in same building. Fire was favored by cheap construction. Firemen handicapped by headway of fire before alarm was given. Persons in building, none. Means of escape, none. Value of building and contents, $5,000.

April 10, 1917. Ballston Spa, N. Y. Eagle Wrapping Corporation. Town of Milton, 2½ miles north of Ballston Spa. Manufacturing wrapping paper. One 1- and 2-story building destroyed. Walls, wood. Floors, wood. Roofs, slate. Cause, unknown. Fire started in 2nd-story stockroom, south end of building. Discovered by employe about 1:15 p. m. Alarm, telephone. Duration, between 3 and 4 hours. Stopped when building was consumed. Fire was favored by wood construction; "dry, dusty and oily." Firemen handicapped by long distance to travel. Private fire apparatus, fire pump, hose and outside hydrants. Persons in building, 40. Means of escape, not reported to SAFETY ENGINEERING. Value of building and contents, about $50,000. Property loss, total.

PIERS AND WHARVES

April 8, 1917. Jacksonville, Fla. Clyde Steamship Company. Riverfront. Steamship freight pier. One 1-story building destroyed. Walls, corrugated iron. Floors, wood. Roofs, metal. Cause, unknown. Fire started underneath floor. Discovered by watchman about 2:45 p. m. Alarm, telephone. Duration, 2 hours, 15 minutes. Fire was favored by construction of building. Private fire apparatus, pipe line on dock. Persons in building, not reported. Injured, 2 firemen slightly hurt. Means of escape, not reported; 1-story building only. Value of building and contents, $125,000. Property loss, $100,000.

RAILROAD PROPERTY

March 29, 1917. Wills Point, Tex. Texas & Pacific Railway Company. Outside city limits. Coal chutes. Three 1- and 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, shingles and boards. Cause, supposedly spark from passing locomotive. Fire started in shingle roof of sandhouse. Discovered by workmen at coal chute about 2:40 a. m. Duration, about 17 days. Stopped

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when coal was all consumed. Fire was favored by poor construction and stock of coal. Firemen handicapped by distance from fire station —about 1½ miles—2,500 feet from nearest fire-plug. Persons in building, 3. Means of escape, ample. Value of buildings and contents, $30,000.

SCHOOLS AND COLLEGES

March 22, 1917. Lowell, Mass. Bartlett vocational school. Clark street. One 3-story building destroyed. Walls, brick. Floors, wood. Roofs, slate. Cause, overheated boiler. Fire started directly above boiler. Discovered by passerby about 3:45 p. m. Alarm, bell. Duration, 4 hours, 45 minutes. Stopped in same building. Fire was confined to one building by good walls and slate roofs. Persons in building, none. Injured, 1 person. Means of escape, stairways. Value of building and contents, $28,000. Property loss, nearly total.

SLAUGHTER AND PACKING HOUSES

March 27, 1917. Muskegon, Mich. Anderson packing and slaughter house. Two 1-story buildings destroyed. Walls, wood and brick. Floors, wood. Roofs, wood. Cause, unknown. Fire started at west end of building. Discovered by passerby about 7:30 p. m. Alarm, telephone. Duration, 8½ hours. Stopped in same building where it started. Firemen handicapped by insufficient hose. Persons in buildings, none. Means of escape, 1-story buildings only. Value of buildings and contents, $70,000. Property loss, total.

TANNERIES

April 1, 1917. Old Fort, N. C. United States Leather Company. Tannery and extract plant. Six or seven 1-, 2- and 3-story buildings destroyed. All built in together. Walls, wood, brick and sheet iron. Floors, wood and cement. Roofs, metal and composition. Cause, unknown. Fire started in upper story of tannery leach house. Discovered by outsiders about 12:30 a. m. Alarm, tannery whistle and cries of "Fire." Duration, about 2 hours. Stopped on the west, against firewall. All buildings consumed. Fire was favored by wood construction. Firemen handicapped by weakened pressure caused by breaks in water pipes in burning buildings. Tannery fire-pump put out of commission through same cause. Private fire apparatus, ample hose connected with town mains and with reservoir. Persons in buildings, none. Means of escape, usual outlets only. Value of buildings and contents, $600,000 to $1,000,000. Property loss, total.

THEATERS AND AMUSEMENT PLACES

March 25, 1917. Troy, N. Y. Powers' Opera House. Third avenue and 17th street. Motion picture theater. One 3-story building with tower partially destroyed. Walls, brick. Floors, wood. Roofs, wood and slate. Cause, unknown. Fire started in 2nd story. Discovered by passerby about 10:37 p. m. Alarm, box. Duration, 4 hours, 20 minutes. Stopped inside the building. Fire was favored by a draft from tower which caused the fire to run up and under the roof. Persons in building, none. Means of escape, 3 stairways and fire escape. Property loss, nominal.

April 7, 1917. Brooklyn, N. Y. Belmont Park race track. Hempstead turnpike near Nassau county line. Two buildings destroyed; 6 others considerably damaged. One- and 3-story. Walls, wood and brick. Floors, wood. Roofs, wood. Cause, incendiary. Fire started in different places simultaneously. Discovered by watchman about 4:15 a. m. Alarm, through Jamaica fire alarm telegraph bureau. Duration, 6 hours, 30 minutes. Stopped after extending to several buildings.

WOODWORKERS

March 22, 1917. Marmora, Ont. Pearce Company, Ltd. Sawmill. One 2-story building destroyed. Walls, wood. Floors, wood. Roofs, wood shingles. Cause, workman making repairs, burned out hole with hot irons. Discovered by workman. Duration, 1 hour. Fire was confined to building. Fire was favored by all wood construction. Persons in building, 4. Means of escape, none. Value of building and contents, $20,000.

April 6, 1917. Chicopee, Mass. Dana S. Courtney Company. Chicopee street. Manufacturing bobbins and spools. One 1-, 2- and 3-story building destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, unknown. Fire started in drying room. Discovered by employe about 9:05 a. m. Alarm, telephone. Duration, 48 hours. Stopped at 3-story portion of building. Fire was favored by inflammable construction and contents of building. Firemen handicapped by low pressure and insufficient volume of water at hydrants, and by long lines of hose from pumping engines. Persons in building, 150. Means of escape, ample. Value of building and contents, probably $150,000.

KILLED AND INJURED IN FIRES

January 9. Minneapolis, Minn. Northwestern Furniture & Stove Manufacturers' Exposition Company. One person injured.

March 22. Lowell, Mass. Bartlett vocational school. One person injured.

March 24. Akron, Ohio. Giant Tire & Rubber Company. One person injured.

March 26. Bristol, Tenn. Mahoney office building. Three persons slightly injured in sliding down rope.

April 3. Mt. Gilead, Ohio. Ireland Bros. Garage. One person injured.

April 4. Jersey City, N. J. Detwiller & Street Manufacturing Company; engaged in manufacturing primers for the Russian government. Explosion of black powder. Nineteen persons burned. Nine girls died later of their injuries.

April 6. Pawtucket, R. I. Taylor block. One fireman cut by falling glass; 5 others overcome by smoke.

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April 8. Jacksonville, Fla. Clyde Steamship Company. Freight pier. Two firemen slightly injured.

April 15. Sharon, Pa. Methodist church. Three volunteer fire-fighters injured.

April 16. Gloversville, N. Y. Hammond Hotel on Mayfield road, 2 miles from town. One life lost.

April 16. Long Beach, L. I., N. Y. Thomas Healy. Restaurant. Two persons injured.

Industrial Poisons Used or Produced in the Manufacture of Explosives

OF more than ordinary interest in the present crisis is Bulletin 219 entitled "Industrial Poisons Used or Produced in the Manufacture of Explosives," just issued by the United States Bureau of Labor Statistics. The study was made by Dr. Alice Hamilton during 9 months of 1916, the 41 factories visited being located in Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and Indiana, employing about 90,000 workers. Of these approximately 30,000 were doing work exposing them to poisons.

The explosives manufactured in these factories are nitrocellulose or nitro-cotton, including pyroxylin and military gun-cotton; smokeless powder; picric acid and ammonium picrate; nitroglycerin and dynamite; trinitrotoluol or TNT, or triton; fulminate of mercury; tetranitraniline or TNA; tetranitromethylanilin or tetryl; nitronaphthalenes; and ammonium nitrate. Their production involves the use of nitric acid, sulphuric acid, benzol and toluol, anilin oil, chlorbenzol and dinitrochlorbenzol, phenol or carbolic acid, sulphuric ether, mercuric nitrate, and amyl acetate. In the course of manufacture certain poisons are evolved as the result of chemical reactions, these being oxides of nitrogen or nitrous fumes, sulphur dioxide, chlorine gas, and ethyl nitrite.

The character of the work required leads to a very high labor turnover, instanced by the fact that in one plant it was necessary to employ about 4,000 men during 13 months to keep up a force of 200.

It was impossible to obtain accurate figures as to the amount of sickness and death caused by work in this industry since the war began. Many cases were never recognized; others were noted by company physicians or insurance physicians who were unwilling to give any information concerning them.

Based upon physicians' reports only, although information as to other cases was obtained, it was found that in 28 plants, in a period of about one year, there were 2,507 cases of industrial poisoning, of which 75 were women. Of the total number of cases 53 were fatal, 2 of which were women. About 55 per cent of the total cases and 53 per cent of the fatal cases were caused by nitrogen oxides and nitric acid, while 28 per cent of all cases and 25 per cent of the fatal cases were due to trinitrotoluol, or TNT.

Nitrogen oxide poisoning or "fume sickness" heads the list because all of these explosives are produced through processes of nitration in which a mixed acid is used; one of the ingredients being sulphuric acid and the other nitric acid, 100 per cent strong. The higher the nitration the greater the danger from fumes. The 1,300 to 1,400 men who suffered from these fumes were employed in making nitrocellulose or nitro-cotton, picric acid or trinitrophenol, the nitrotoluols, nitrobenzols, nitronaphthalenes, nitroglycerin, and the nitric acid needed for these processes.

An extremely dangerous process is the filling of shells with trinitrotoluol (TNT)—pressing produces much dust, molding involves fumes.

The report describes the physiological action of the poisons mentioned.

Safety standards and precautionary measures applicable to the manufacture of certain explosives, adopted by Massachusetts and Pennsylvania, and employed in Great Britain, appear as appendices to the bulletin.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

SCIENTIST MODEL 53 SAFE CABINET WITHSTANDS 2060 DEGREES OF HEAT

The Safe Cabinet Company, Marietta, Ohio, on March 6 held its annual public Furnace and Dropping Test. This company has conducted these tests for several years in the presence of disinterested authorities, to demonstrate fairly and conclusively the heat resisting qualities of the Safe Cabinet, as compared with other makes of cabinets and safes. The heat resistance of a fireproof cabinet is the most important consideration of its actual worth. This fact no doubt will become recognized more fully by the public as a better understanding of fire prevention requirements spreads throughout the country. It seems strange that with instances continually occurring of the collapse of so called fireproof safes, when subjected to fire, that greater discretion is not shown in the purchase of such an article as a fireproof container for valuable papers, documents, books, etc.

In the presence of fire the only quality that counts is the resistance offered to heat and flame. If a safe or cabinet does not possess sufficient heat resisting qualities to preserve its contents from fire destruction, it is worthless for the purpose for which it is intended, namely, to safeguard against fire destruction.

We cannot foretell to what degree of heat a cabinet may be subjected, or how long, in the event of fire. Neither can we assume to what strain it may be subjected in falling from a collapsing structure. It is therefore highly important that a cabinet possess heat resistance and also strength to withstand violent strain from falling, and debris falling from collapsing walls, etc., in the highest degree obtainable. The reports of fires too often disclose that many so called fireproof cabinets and safes are worthless when subjected to severe heat and strain. The word "fireproof" is a very misleading term and means little to the trained fire preventionist, who knows that it is often used without justification. The only method we have of determining to what extent a product is fireproof is to know its heat resistance expressed in degrees of heat.

The tests conducted by the Safe Cabinet Company each year have created considerable interest, as these tests exceed the heat and precipitation conditions which prevail in the majority of fires. The 53 SCientist Model Safe Cabinet established a remarkable heat resisting and precipitation record at this test, withstanding heat registered as high as 2,060 degrees F. and preserving the contents without damage through this terrific heat. The accompanying illustrations show the 53 SCientist Model and the contents before and after the furnace test and also the cabinet being precipitated while white hot from a height of 30 ft. from the ground.

Safe Cabinet before test

The particulars of this test are interesting to all those who desire to acquaint themselves with the great improvement and progress which has been made by this company in the heat resistance and dropping of the safe cabinet. Contents as shown in photographs remained in the cabinet which was locked and placed in the furnace for one hour, the maximum tempera-

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Safe Cabinet after test. Note bills on second shelf.

ture registered being 2,060 degrees F., after which the heat was turned off and the cabinet white hot was placed on an elevator and taken to a platform 30 feet from the ground. It was then hurled to the ground where it alighted on edge. 1,700 pounds of brick and debris were thrown upon it. It was then again placed in the furnace where it remained for another hour the heat reading as high as 2,015 degrees F. The Safe Cabinet was then cooled by water and doors opened and all the contents were found unharmed as shown in accompanying photograph.

This test demonstrated that the SCientist Model No. 53, as far as we know, possesses a higher heat resistance record than has ever been achieved before in a cabinet, and also withstands a strenuous precipitation test successfully.

PYROLIN FIRE-RESISTING PAINT

A problem which has long confronted Fire Preventionists has been a means whereby wood and other combustible material could be rendered proof against combustion. In this connection it is interesting to note the result of a test made by the United States Department of Agriculture Forest Service at the Forest Products Laboratories, Madison, Wis., on March 15. This test covered the inflammability of untreated wood and of wood treated with fireproof compounds. The report on inflammability test on wood painted with Pyrolin Factory Interior White clearly shows the value of this substance as a fire retardant.

The test was made by means of electric current passed through the heating coil to give the plates a temperature of approximately 325 degrees Centigrade. The radiated heat caused a distillation of the wood or the giving off of volatile inflammable gases. To ignite these gases the pilot light was flashed up past the face of the specimen at 5 second intervals. Three specimens of cypress board painted with Pyrolin Factory Interior White were subjected to the test. The first specimen was

Safe Cabinet being dropped 30 feet white hot immediately after furnace test

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exposed to the heating plate for 30 minutes. No ignition occurred during that time and the specimen was not charred through. The second specimen was exposed to the heating plates 40 minutes without igniting and was charred through. The third specimen ignited after 8 minutes exposure and burned poorly for 11 minutes when it went out and could not be ignited again.

The manufacturer of Pyrolin—The Pyrolin Company, Fort Dodge, Iowa, applied a plumber's blow-torch generating 2,100 degrees of heat for an hour to a piece of cypress wood painted with one coat of Pyrolin Factory Interior White. At the expiration of that period a hole was charred through the wood, but the board did not ignite. Pyrolin not only possesses these strong fireproof qualities but is a first class paint and is therefore adaptable for use wherever paint is used.

As a large number of fires are caused through sparks alighting on adjacent buildings, such as the Atlanta conflagration of recent date, it would seem that there is a great need for coating, especially the outside of combustible buildings with fireproof paint.

SAFETY APARTMENT HOUSE PANELS

The Metropolitan Electric Manufacturing Company, Long Island City, New York, is introducing a new safety panel board, especially suitable on account of its construction and narrowness for apartment houses, residences, hotels, institutions, etc., where lightness of structure, small dimensions, flexibility of design and safety against accidents and panic are desired. These panels are known as NARO-SAFETY PANELS. As no live parts are exposed, the danger to electric shock is removed. The manufacturer mentioned above will gladly furnish particulars upon request.

MERCHANT & EVANS SAMPLE SETS

The Merchant & Evans Company, Philadelphia, the well known manufacturers of fire doors, shutters, ventilators, metal shingles, etc., etc., have prepared a set of samples 7 x 5 inches of their high grade roofing plate mounted on a celluloid holder for hanging on the wall or desk. In addition there are cards describing the quality of the plates and additional cards refer to Evans "Almetl" Fire Doors and Fire Shutters, Star Ventilators, Metal Shingles, etc., also specification how to lay a tin roof.

This company stated that there is a lively demand for these samples among architects and engineers and the supply is rapidly diminishing. Those who have occasion to specify or purchase such products should apply without delay for a set of these samples.

BABBITT MASK PREVENTS SERIOUS ACCIDENT

The value of taking all precautions against accidents and furnishing workmen with necessary safeguards is graphically illustrated by the following incident which occurred recently in one of the plants of the Carnegie Steel Company.

A 48-inch cast iron water line was to be poured. Everything was ready, babbitt masks were placed on two of the men, the pouring was proceeding perfectly when without warning the lead began to spit out of the gate. Then instantly the babbitt splashed over the mask and also over the glass. Had the man not been wearing a King Babbitting Mask he would have been very badly burned and would probably have lost one if not both of his eyes.

Mask showing heavy deposit of babbitt

The Carnegie Steel Company has been one of the foremost concerns in this country in conducting safety campaigns in its various plants and has done a very great deal to prevent as far as is humanly possible accidents to its employes. This babbitting mask undoubtedly saved the wearer from a horrible accident and the probable loss of both eyes!

Every pourer should be furnished with such protection. It is not enough to take every precaution to do the work carefully, sudden accidents will happen, and unless the operators are safeguarded against these unexpected accidents there must be a large number of serious preventable accidents. This instance again demonstrates that prevention is a thousand times better for both employer and employe than anything which can be done after the accident has happened.

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OXY-ACETYLENE WELDING AND CUTTING

The Oxweld Acetylene Company, Newark, N. J., have recently issued catalog number 3 which should be interesting to all those who weld and cut metal. In advocating the use of eye protectors for this work this company calls attention to the fact that acetylene burns with a pure white flame—the nearest to sunlight of any illuminant.

When burned in the welding and cut blow pipes this luminous quality is almost entirely destroyed by the admixture of oxygen which causes the acetylene to burn with a blue and practically non-luminous flame. The light given off from the weld in process of formation goes slightly from the blow pipe and more largely from the molten metal. This light does not contain more of the injurious rays than would be found in any other light from a similar source of intensity.

The discomfiture which results from looking at an acetylene weld with the eyes unprotected for any length of time is the same which occurs from looking at any very intense light such as an electric lamp, molten metal in steel works, etc. This is purely a temporary strain without any of the injurious effects such as the result from the ultra-violet, infrared or actinic rays. Goggles are recommended for a protection against this eye strain and also against sparks and molten metal.

JOHNS-MANVILLE ENLARGES QUARTERS IN PITTSBURGH

A sure indication that Pittsburgh is getting alive to the fire hazard is indicated by the fact that owing to the large increase in the demand for asbestos products the H. W. Johns-Manville Company requires a substantial increase in its already large quarters in Pittsburgh.

The show rooms and sales offices of this company are now located on the ground floor of the Westinghouse Bldg., which is located in the heart of Pittsburgh's business district.

ASBESTOS BUILDING LUMBER FOR WHARVES AND PIERS

At the last annual meeting of the Railway Fire Protection Association the subject of fire prevention and protection of wharves and piers received careful consideration. The report of the Committee recommended that cement and asbestos typified by "Transite Board" is very well suited for wall coverings and being non-corrosive and requiring no paint is economical in the end.

The Keasbey & Mattison Company, Ambler, Pa., report that their Ambler asbestos building lumber is largely used by railroads, the United States Government and other concerns throughout the country for wharf and pier construction. This material is also especially suitable for elevator shafts and chutes, being fireproof it prevents the carrying of fire from one part of the building to another by way of elevator shafts.

Further particulars of the above mentioned product can be obtained from Keasbey & Mattison Company, Ambler, Pa.

FIRE RESISTIVE PUTTY

John Marx, 54 Paterson Avenue, Newark, N. J., manufactures a putty especially suitable for the installation of wire glass windows which resists heat and does not give off smoke in excessive volume when heated and is not readily inflammable. This putty has been approved by the Underwriters Laboratories and is preferable to ordinary putty as a fire resistent. It remains securely in position and prevents the passage of fire and smoke around the edges of the wire glass.

In a number of prominent buildings in New York John Marx Fireproof Putty has been used, among which may be mentioned National Biscuit Co., Metropolitan Street Railroad Co., Packard Garage Bldg., etc., etc.

PREVENTING GASOLINE EXPLOSIONS

In many industrial plants gasoline and other dangerous liquids must be constantly handled. Many accidents have occurred through explosions due to the unsafe method of handling. But such accidents are almost entirely preventable if safe precautions are taken. The McNutt Can Sales Company, 254 Church Street, New York, has specialized for years in the manufacture of safety cans for all industrial requirements, and this concern reports that it is prepared to design safety cans for any special requirements. This concern has recently designed a combination gasoline or rubber cement bench can, fitted with a floating valve and removable cover, which is always ready for use and removes the danger of explosion. Further particulars can be obtained from the manufacturer mentioned above.

EVERYTHING FOR MINE AND INDUSTRIAL SAFETY

This is the title of the handsome catalog now being distributed by the Mine Safety Appliances Company, 539 Fourth Avenue, Pittsburgh, Pa. This concern supplies a wide range of devices for the protection of industrial workers, including mine workers, and the comprehensive catalog explains and illustrates their many safety and first aid equipment.

The idea in furnishing this complete catalog to safety engineers is that through the numbering and pricing of each article together with an illustrated description the safety engineer can order what he needs in the shortest time. The catalog comprises 100 pages of descriptive matter and illustrations.

A copy will be sent to any safety official who requests same from the above mentioned concern.

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PEELLE DOORS

The Peelle Company has been recognized as one of the leading manufacturers of counter balanced fireproof doors for elevator shafts in this country. In addition to the features of these doors that make them fire and accident safe, their construction has earned for them a reputation in this field. The panel doors are constructed of high grade lumber with standard fire door terne covering. The panels are uniformly supported by structural steel frames. These travel smoothly on steel tracks. The tracks are attached to the walls like elevator tracks.

These doors are approved by The Underwriters' Laboratories.

STAIR SAFETY

At the National Fire Protection Association Conventon great interest was manifested in the report of the committee on safety to life and the methods best suited to permit occupants of upper floors of loft buildings to pass out of the building by the stairway, as quickly as possible, was carefully considered. There is no question but that the condition of the stairs themselves has an important bearing on this important question. The stairs should be in such a condition at all times whereby a safe foothold will be assured.

The American Abrasive Metals Company call attention to this and suggest that their product, Feralun Safety Tread, provides a firm foothold and prevents slipping. In addition, Feralun, being a metal product, is not combustible and will retard the spread of fire on the stairways.

Any interruption such as a person falling when a number of people are hurrying to leave a building which is on fire would be a cause for panic—always a dangerous and often a fatal attendant in the presence of fire. In a large number of buildings the stairways seems to have been constructed and erected with little thought to a quick and safe emergency exit. Highly polished stone, badly worn wood are frequently observed and would undoubtedly prove an impediment should such stairways be needed for a large number of people to pass down quickly.

The American Abrasive Metals Company, 50 Church Street, New York, will be pleased to furnish information on this important angle of safety to life against both fire and accident.

UNDERWRITERS' LABORATORIES'

Recent Approvals and Reapprovals

The Underwriters' Laboratories, Inc., Chicago, under the direction of the National Board of Fire Underwriters and in co-operation with the Workmen's Compensation Service Bureau, maintains laboratories for the examination and testing of appliances and devices, and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object is to give to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

"ARMATUBE" GASOLENE HOSE. Boston Woven Hose & Rubber Co., Mfr., Hampshire St., Cambridge, Mass.

AUTOMATIC FIRE DOOR RELEASE. Ohio Automatic Sprinkler Co., The, Mfr., Youngstown, Ohio.

BOILER GAUGE GLASS PROTECTOR. Sargent Co., Mfr., 1418 Fisher Bldg., Chicago, Ill.

CHEMICAL EXTINGUISHER—1 QUART PUMP TYPE. Electrene Co., Mfr., Whitehall Bldg., New York City.

CHEMICAL EXTINGUISHER—2½ GALS. LOOSE STOPPLE TYPE. Rowe & Son, A. C., Submitter, 33 Reade St., New York, N. Y.

COUNTERBALANCED STEEL ELEVATOR DOOR. Saino Fire Door & Shutter Co., Mfr., 2025 Elston Ave., Chicago, Ill.

ELEVATOR CONTROL APPLIANCE. Warner Elevator Mfg. Co., The, Mfr., 2613 Spring Grove Ave., Cincinnati, Ohio.

ELEVATOR CONTROL APPLIANCE. Chicago Safety Appliance Co., Mfr., 208 So. La Salle St., Chicago, Ill.

ELEVATOR CONTROL APPLIANCE. American Safety Utilities Co., Mfr., 1018 Peoples Gas Bldg., Chicago, Ill.

"GLOBE MODEL 3" DRY PIPE VALVE. Globe Automatic Sprinkler Co., Mfr., 2019 Washington Ave., Philadelphia, Pa.

HARDWARE SWINGING PATTERN DOOR CLOSERS. Rixson Co., Oscar C., Mfr., 501 S. Jefferson St., Chicago, Ill.

HOLLOW METAL FIRE WINDOW FRAMES. Henseler & Naused Co., Mfr., 1322-24 Marshall St., Minneapolis, Minn.

METAL ROOF COVERINGS—CLASS A. National Fire Protection Association. Office of the Secretary, 87 Milk St., Boston, Mass.

NIAGARA, ISSUE B, AUTOMATIC SPRINKLER. Automatic Sprinkler Co. of America, Mfr., 123 William St., New York City.

NIAGARA ALARM VALVE. Automatic Sprinkler Co. of America, Mfr., 123 William St., New York, N. Y.

"NSCO" SANITARY FLOOR DRESSING. National Supply Co., Mfr., 2200 Avenue C, Birmingham, Ala.

RUBBER-COVERED WIRE. Atlantic Insulated Wire & Cable Co., Mfr., 52 Vanderbilt Ave., New York, N. Y.

SASH LOCKS FOR SLIDING WINDOWS. Allith-Prouty Co., Mfr., Danville, Ill.

SIGNAL APPLIANCES—MISCELLANEOUS BATTERY SETS. Stanley & Patterson, Mfr., 23 Murray St., New York, N. Y.

SLIDING OR SWINGING SHEET METAL FIRE WALL DOOR. United States Metal Products Co. of the Pacific Coast, Mfr., 750 Keller St., Los Angeles, Cal.

SLIDING OR SWINGING, TIN CLAD, FIRE WALL DOOR. Deming & Thompson Co., Mfr., Frankfort, Ind.

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SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

SAFETY ECLIPSING DANGER

Vol. XXXIII, No. 1 JANUARY, 1917 25 Cents

This man is a chance taker or otherwise he would not be welding without the Hardy Welding Goggle. He illustrates how thousands of men have lost their eye sight.

This man realizes the eye hazard in Welding and takes no chances. He welds the safe way through his Hardy Welding Goggle.

The man in the circle is wearing the Hardy Welding Goggle—which saves the eyes of every wearer and should be worn by every welder.

Goggles for all Industrial Purposes

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JOHN H. HARDIN, President

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Pyrene

KILLS FIRE
SAVES LIFE

WHAT A PITY!

WHAT INEXCUSABLE WASTE!

Yesterday it was a thriving business. Today it is a pile of brick and scrap iron.

A whole year's business gone "up in smoke." A year's profits ruined. Trade lost. Contracts unfulfilled.

And why? Because someone, somewhere failed to heed the fire warning.

One Pyrene would have stopped the fire when it started. A few quick shots from Pyrene and there would have been no such calamity.

Pyrene kills all kinds of fire—instantly—but harms nothing else. Good until used. No upkeep cost.

Sold by dealers everywhere.

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Makers of a complete line of fire appliances

New York City

PYRENE MFG. CO.

52 Vanderbilt Ave., New York City.

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Name .....

Address .....

City .....[S.E.]

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EVEN THE BABIES KNOW WHY

n providing your workmen with Safety Goggles, you protect them, their families— *nd yourself.* King's *'Saniglas'* are the right kind

JULIUS KING OPTICAL COMPANY

EW YORK
-12 Maiden Lane

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How the Ford Motor Company teaches its employes safety.

The machine used at this safety meeting was a

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This machine because of its perfect projection, flickerless pictures and safety features is universally preferred for showing safety films at safety meetings. Every safety meeting needs a Power's Cameragraph.

Nicholas Power Company

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THE MAGAZINE OF SAFETY

SAFETY ECLIPSING DANGER

Vol. XXXIII. No. 2 FEBRUARY, 1917 INDEXED 25 Cen

The Welder in his work faces extreme eye hazard. Should the destructive welding rays reach his eyes, his eyesight will be destroyed. To prevent this he wears the

Hardy Welding Goggle

with

Noviweld Lenses

They save welders' eyes. Every welder should wear them.

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Any of the Above Publications Mailed to Ætna Policyholders on Request.

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SAFETY ENGINEERING

THE MAGAZINE SAFETY ECLIPSING DANGER OF SAFETY

Vol. XXXIII. No. 3 MARCH, 1917 INDEXED 25 Cents

THIS MAN'S EYES ARE NOW EQUIPPED TO FACE ANY WELDING OPERATION SAFELY: HIS EYES ARE GUARDED AND PROTECTED BY THE

HARDY WELDING GOGGLE

FITTED WITH

NOVIWELD LENSES

WHICH PREVENT DANGEROUS WELDING RAYS REACHING THE EYES. EVERY WELDER NEEDS THEM.

GOGGLES FOR ALL INDUSTRIAL REQUIREMENTS

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JOHN H. HARDIN, President

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THIS FIRE LASTED JUST TWO AND ONE-HALF MINUTES.

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This employer was ready for fire. Ready with Pyrene. Pyrene on pillars. Pyrene against walls. Pyrene at stairway landings. Pyrene in elevators. Pyrene in the dynamo room. Pyrene in the offices.

When fire came several men grabbed Pyrenes. The concentrated extinguishing liquid smothered the fire in no time. Pyrene kills fire—quick.

Pyrene Manufacturing Company, New York

Every Appliance for Fire Protection.

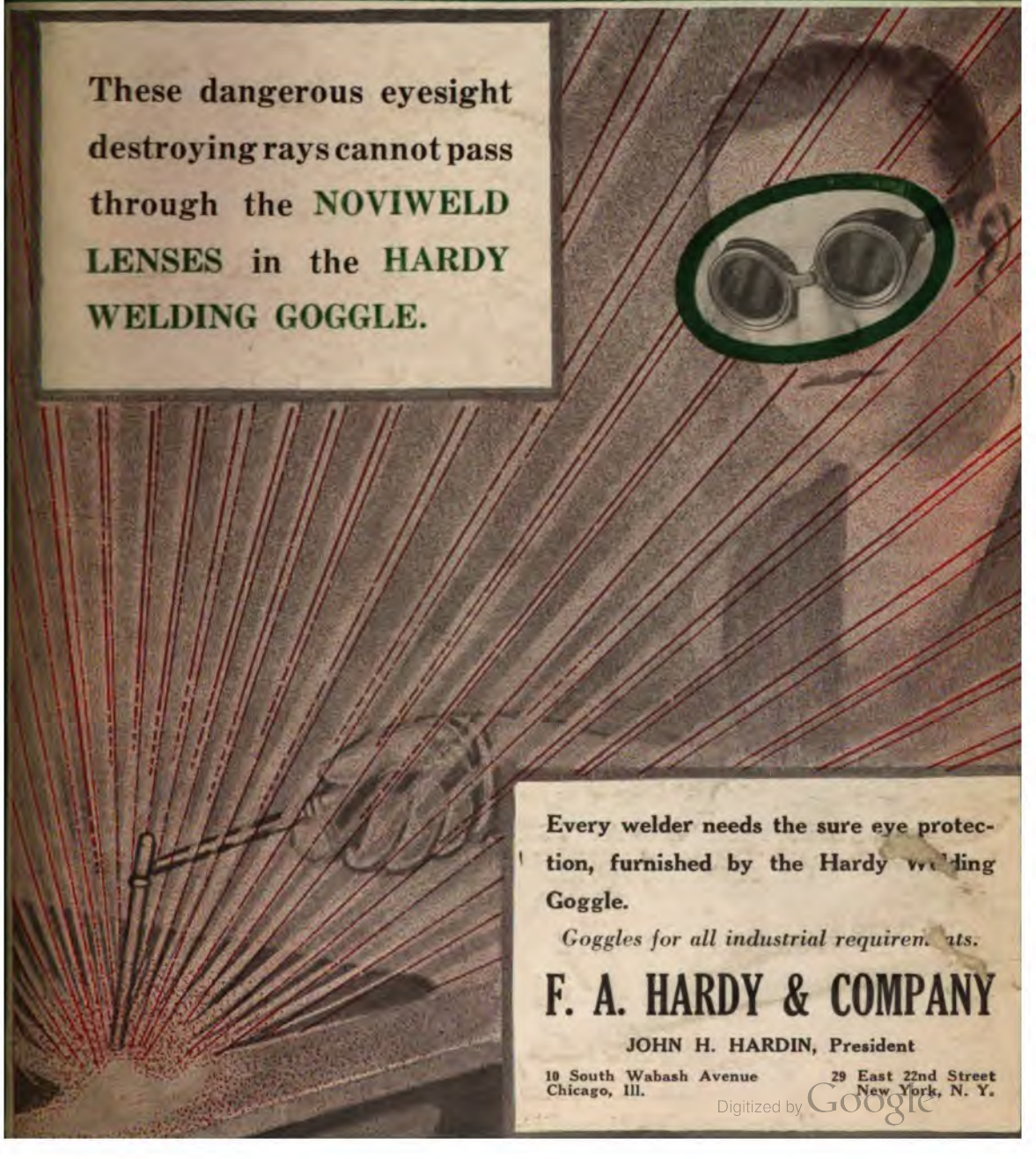
Google

SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

Vol. XXXIII. No. 4 APRIL, 1917 25 Cents

These dangerous eyesight destroying rays cannot pass through the NOVIWELD LENSES in the HARDY WELDING GOGGLE.



Every welder needs the sure eye protection, furnished by the Hardy Welding Goggle.

Goggles for all industrial requirements.

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S1C

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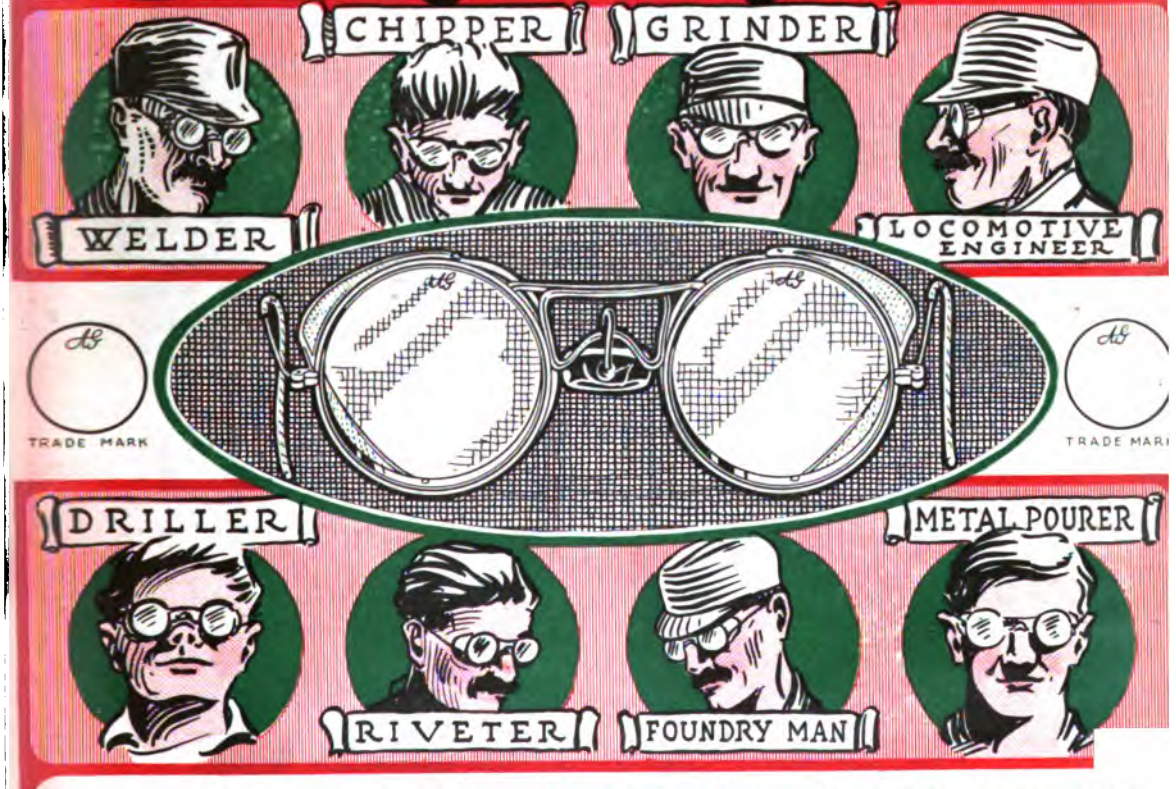
TRADE MARK REGISTERED



There is an Adjustoglas goggle for every operation which is dangerous to the eyes: grinding, riveting, welding, polishing and many other operations.

Anyone can wear an Adjustoglas, because it can be adjusted to the individual requirements of the wearer and *it is comfortable.* We want to prove these assertions to you—may we send you a sample? Drop us a line today, the sample will come by return mail—but remember

Don't merely order goggles—specify Adjustoglas

Trade marked on rim and lens

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PYRENE MANUFACTURING COMPANY

Every Appliance for Fire Protection

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SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

Vol. XXXIII. No. 6 JUNE. 1917 25 Cents

All the Open Knife Switches in our plant have been REPLACED with Square "D" Steel Enclosed Switches.

—The Safety Engineer

It doesn't require much of an outlay to replace every open knife switch in your plant with a

SQUARE "D" STEEL ENCLOSED SWITCH

It is much more economical to be SAFE with Square "D" Steel Enclosed Switches than SORRY after open knife switches have caused a fire, badly injured one of your men or done some other serious damage—

Why have them lurking around anyway? Why not scrap them and be safe?

Write for Catalog 23

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FIRE PREVENTION, CONSERVATION and PROTECTION ENGINEERING

FRANKLIN WEBSTER, Editor

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The Fire Scourge

This issue of SAFETY ENGINEERING calls special ention to the urgent necessity for an intensive fire pre- ıtion campaign. The fire loss in this country last year s 9,000 lives sacrificed and $231,442,995. For years ıerica's fire loss has been several times that of any other ıntry. The sacrificing of life and the wasting of a huge n of money at a time when this nation needs all its re- ırces to meet the demands of war, is little short of a me. It certainly is a national disgrace.

The time has now arrived for this slaughter and de- uction to cease within our borders. Every property ner should constitute himself or herself a Fire Prevention mmittee of one to do all in their power to reduce our palling fire loss. It is their duty to give immediate at- ıtion to making their property as safe against fire destruc- n as possible; by taking proper precautionary measures d installing the necessary protection devices against fire out 60% of our total fire loss could be prevented.

New calls are being made upon our resources which ıy tax them very severely. We must stop the leaks, the ınton waste and destruction of lives and assets from thin, in order that we can maintain a constant supply without. It is especially important that industrial ants in America be immediately safeguarded against fire struction. We are now at war and are depending upon e industries of America to furnish the sinews of war for r victory. We cannot afford to have industrial plants ecked through fire destruction. Production is too im- rtant and urgently needed.

This issue of SAFETY ENGINEERING should be rused with more than usual care. The information in ese pages if acted upon will go a long way to reducing nerica's ash-heap, and now is the time to do it; tomorrow ıy be too late.

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Secretary Redfield Urges Fight on Fire Loss

Secretary Redfield addressing the National Fire Protection Association in convention, Washington, D. C., May 8, 1917, said:—"If the same intensive methods of conservation as are being used now for war purposes were applied to fire protection problems, a great proportion of the $250,000,000 annual fire loss could be prevented."

This appeal to the Fire Preventionists of America should not go unheeded. The stupendous fire loss in America is a national disgrace which is only magnified in the face of conditions now confronting this country. Every one who considers himself a fire protectionist and who has the interest of his country at heart, and this should be the foremost motive of every American today, should exert himself to do all in his power to reduce the fire loss.

The government needs this $250,000,000 to help meet the enormous financial strain which now rests upon this country. The following pages of SAFETY ENGINEERING illustrate and describe what is needed to safeguard life and property against fire destruction. America has "regretted" its fire loss long enough. The call of duty now demands that it be reduced, and it is only by the installation of such products and materials as are shown in the following pages that property can be made safe against fire destruction. Familiarize yourself with them, urge them, specify them and pass the knowledge along. Make up your mind to answer the appeal of your country and do your duty with credit as a fire preventionist. Urge the use of the products, materials and devices which prevent and extinguish fire.

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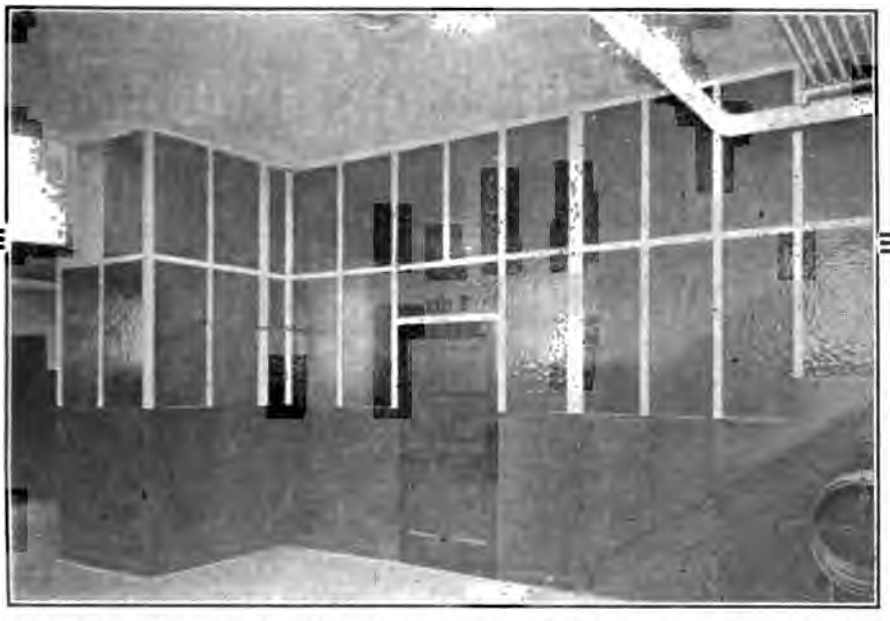

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THE ATLANTA CONFLAGRATION JUST BREAKING OUT OF THE FIRST BUILDING

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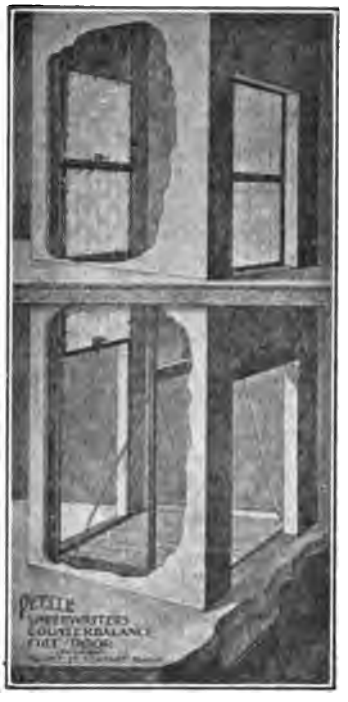

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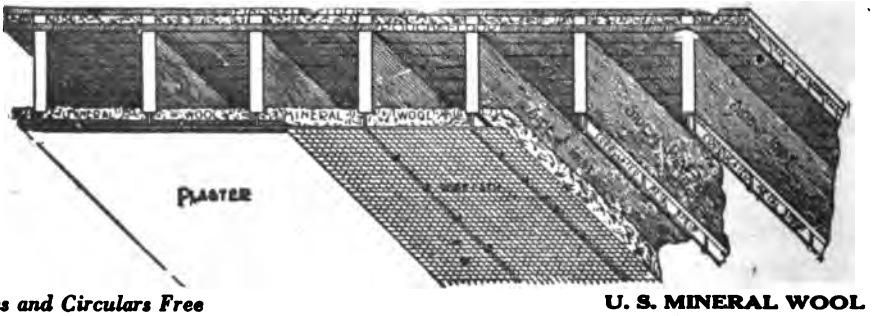

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New York Chicago Philadelphia Boston St. Louis Cleveland
Cincinnati Pittsburgh Detroit Birmingham Kansas City
Minneapolis Nashville Salt Lake City Seattle Peoria
THE PATERSON MANUFACTURING CO., Limited
Montreal Toronto Winnipeg Vancouver
St. John, N. B. Halifax, N. S. Sydney, N. S.

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The Nation Burns Up $250,000,000 a Year

"Americans" said Secretary Redfield, "would rather hand a roll of bills to a fellow than save a nickel. They are the most wasteful people in the world."

Hence the staggering fire loss—$250,000,000 a year. A sum that would more than pay interest on the entire war loan.

Carelessness causes fire. Carelessness is poor patriotism. Carelessness is poor business judgment.

When a man fails to equip his factory against fire, that is carelessness of the worst kind. He risks heavy financial loss, loss of trade, loss of life. And he helps to pile up the nation's huge fire loss.

All factories, all schools, all offices, all buildings equipped with a good fire extinguisher will go far to cutting down the awful loss.

Pyrene is quick and sure. Pyrene kills fire at the very start. Pyrene keeps small fires from getting big. Price $10.00 with bracket

PYRENE MANUFACTURING COMPANY, NEW YORK

Every appliance for fire protection

Digitized by Google

WIRE GLASS WINDOWS

Safeguard all buildings against fire spread. No matter what the construction, if the windows are not *Approved* wire glass in *Approved* metal frames, there is danger to the spread of fire through windows.

SAFETY GLAZING

Look for the three twist at the vertical strand. This is our distinguishing mark as authorized and approved by the Underwriters Laboratories.

This company has specialized in the manufacture of high quality wire glass for many years.

"WESTERN WIRE GLASS"

is dependable for all requirements.

WESTERN GLASS COMPANY

STREATOR, ILL.

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At The National Fire Protec

Washington,

Serious
burning
pants in the
discussed. An

Missis

on all stair

Wherever
vators it should

Missis

Strong

Mississippi Wire

Chicago
7 West Madison Street

New
222 Fifth

Remember You Saw This in Safety Engineering

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tion Association Convention

May, 1917

consideration was given to the exit hazard from buildings—How to empty the upper floors of occu- shortest time and prevent panic on stairs was installation of

sippi Wire Glass

windows, doors and skylights will secure:

Fire retarding conditions,
More and better light,
Greater strength than is afforded by ordinary glass.

glass is used around stairways, skylights and ele- be

sippi Wire Glass

Shock Proof **Fire Retardant**

Glass Company

York **Avenue**

St. Louis
4070 N. Main Street

Digitized by Google

Safety To Life!

When stairs in a crowded factory or loft building are being put to emergency use, particularly in cases of fire alarm, it is absolutely essential that the treads of those stairs, in addition to being fire-resistant, also shall be so constructed and maintained that it is impossible to slip or trip thereon, thereby greatly reducing the panic hazard and increasing safety to life.

Approved Construction—"FERALUN" in Concrete Steps.

Stair Treads to be SAFE must be SLIP-PROOF as well as FIRE-PROOF

Use "FERALUN"

Stair treads and other tread surfaces such as door saddles, floor plates, trench covers, etc., when made of "FERALUN" are so constructed and are in such condition that it is impossible to slip or trip on them. They are SLIP-PROOF as well as FIRE-PROOF

AMERICAN ABRASIVE METALS CO.

50 Church Street, New York, N. Y., U. S. A.

Exhibitor National Exposition Safety and Sanitation, New York, September, 1917.

Remember You Saw This in Safety Engineering

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Secretary Redfield

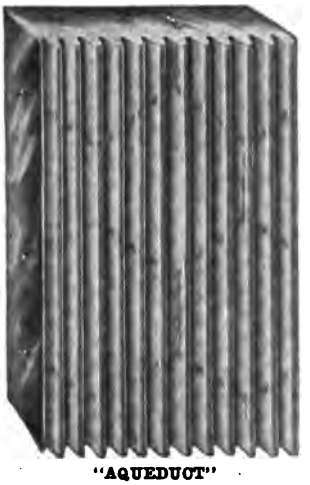
Made an earnest plea before the National Fire Protection Association for a reduction in the annual fire loss.

Every property owner should safeguard his building against the entry of fire through windows—the cause of a large proportion of the total fire loss.

"COBWEB"

Wire Glass Can Be Cracked But It Will Not Shatter.

It Is the Only Transparent Building Material That Is Fire and Break Proof.



"AQUEDUCT"
(Guaranteed)

Wire glass windows are universally recognized by fire preventionists as the most powerful retardant against fire.

This company manufactures approved wire glass for all purposes; and all types of buildings.

We maintain an Engineering Department at our New York office and will gladly study your requirements with a view to giving you, without charge, the benefit of our many years' experience, in the maximum utilization of daylight combined with the reduction of break and fire hazards.

Pennsylvania Wire Glass Company

PHILADELPHIA
Pennsylvania Bldg.

NEW YORK
20 West 34th Street

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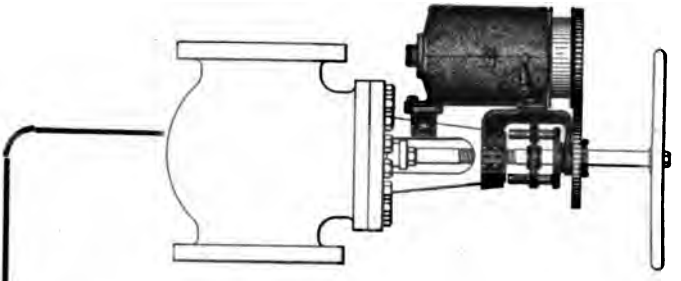

It Will Stop Your Engines Should a Fire Break Out.

Should a fire break out in your plant, there will be a hurry for exits.

You cannot trust your men to shut off the engines —and in their haste, your workmen may be seriously injured by your moving machinery.

MONARCH Engine Stop

will act in conjunction with your Fire Alarm System, will stop your engines and shut down your machinery as soon as the alarm sounds.

This feature will appeal to every employer interested in accident and fire prevention.

This is only one of the many ways by which the MONARCH will make your plant safe. Our engineers will be glad to place at your disposal their years of experience in this field.

CONSOLIDATED ENGINE STOP COMPANY, Inc.

Specialists in All Types of Engine Stops and Speed Limit Devices

351 West 38th STREET **NEW YORK CITY**

Digitized by Google

Fire Protection
Is Your Biggest Asset Towards Fire Prevention

"Be Ready"—catch the blaze on the jump. Put it out while it's small. Every factory, home, garage and car should be equipped with this latest Fyr-Fyter.

Fyr-Fyter NEVER FAILS

APPROVED BY UNDERWRITERS' LABORATORIES

Puts out all incipient fires at the start—including electrical short circuits and gasoline.

Pump handle works both ways, shooting a continuous stream 25 to 30 feet. Compounding action makes it possible for operator to fight fires in tight places.

Let us tell you and show you why many of America's largest manufacturers have equipped their factories throughout with Fyr-Fyters. Full information on request.

THE FYR-FYTER CO.
107 Patterson Bldg., Dayton, Ohio

Insurance Agents—Get our special interesting proposition for you. Write.

Exhibitor National Exposition Safety and Sanitation New York, September, 1917

Remember You Saw This in Safety Engineering

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Badger's Chemical Engines

Examined and tested by Underwriters' Laboratories, Inc., and "APPROVED FOR USE"

FOR PRIVATE ESTATES, TOWNS, MANUFACTURING PLANTS AND INSTITUTIONS

Warehouse Type

Truck Type

SIMPLE
DURABLE
EFFECTIVE

A Highly Efficient
One Man Fire Department

MANUFACTURED BY
BADGER FIRE EXTINGUISHER CO.

New York Office: 123 William Street — 32 Portland Street, BOSTON, MASS.

FIRE PREVENTION is a cause

where results are expressed in dollars and cents in your increased profits. Protect your business against interruption by fire and you protect your profit account.

The No. 40 Champion Chemical Fire Engine is the most effective agency for fire prevention with which to equip your plant.

The No. 40 Champion tank is of the same capacity as the chemical tank ordinarily placed on fire department apparatus. The No. 40 is positive in action, readily controlled and easily handled.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.
ELMIRA, N. Y.

Exhibitor National Exposition Safety and Sanitation, New York, September, 1917.

Remember You Saw This in Safety Engineering

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A solid ¾" stream thrown across pond at the Draper Mfg. Co. plant at Hopedale, Mass. Stream controlled by Eastman Perfection Holder.

EASTMAN

Perfection Holders, Nozzles and Deluge Sets

Obtain the Full Value of Your Fire Fighting Facilities

Producing More Solid, Longer Distance and More Effective Streams

The Eastman New Nozzle System for Corporation Use

LARGE, POWERFUL streams are a NECESSITY for large fires, which class make up the tremendous losses of the country, and we provide for this emergency in the simplest, most practical method, at a very small outlay

SAMUEL EASTMAN CO., Sole Manufacturers, CONCORD, N. H.

KEYLESS
AUX. FIRE ALARM BOX
SIZE 4X6 IN.

IN CASE OF FIRE BREAK THE GLASS AND PULL RING DOWN. HOLD DOWN FOR "RETURN SIGNAL" FROM THE STREET BOX IN MOTION.

The Gamewell Company

Manufacturers and Contractors for Over 57 Years of

Fire Alarms and Police Signal Telegraphs

Complete systems installed for municipal service, controlled by central office apparatus, and operated by storage battery, fitted with all the latest up-to-date appliances.

Our *Auxiliary System* makes it possible to connect interiors of premises *Instantaneously with Fire Department Headquarters*, through the *Public Fire Alarm Apparatus*, by providing any number of interior stations or signal boxes, from which the street alarm box can be operated instantly. Correspondence solicited.

GENERAL OFFICES AND WORKS,
NEWTON UPPER FALLS, MASS.
NEW YORK OFFICE, SUITE 5708, GRAND CENTRAL TERMINAL.

THE E. HOWARD CLOCK CO. Boston, Mass.

The very latest thing in a watchman clock record. Entire record sheet always visible at once. Can be used without change from Saturday to Monday, or over a holiday, and a clear record secured.

Please write any of our offices, Boston, New York or Chicago, for particulars, or address E. A. Bigelow, Treasurer, 373 Washington St., Boston, Mass.

Remember You Saw This in Safety Engineering

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This Mask is Specially Designed for Ammonia Plant Engineers, City Firemen,

Manufacturing Chemists, or any one who comes in contact with deadly fumes.

RESPIRATORS

FOR EVERY SERVICE

The most complete line manufactured by any one firm in the United States. Face Masks and Respirators for Ammonia, Smoke, Dust and Chemical fumes.

Prices range from 50c. to $50.00 each. Send for descriptive price list.

HERBERT GARNETT

Box 247, Central Station, TOLEDO, OHIO

Dept. E.

R. D. WOOD & CO.

Engineers
Iron Founders
Machinists

PHILADELPHIA PA.

MATHEWS'
Single and Double Valve

FIRE HYDRANTS

Gate Valves
Valve Indicator Posts

Manufacturers of All Kinds and Sizes of

Cast Iron Pipes

"The Largest Fire Insurance Company in America."

THE HOME INSURANCE COMPANY NEW YORK

Main Offices, 56 Cedar Street

ELBRIDGE G. SNOW, President

Cash Assets, January, 1917	$40,047,514.55
Reserve as a Conflagration Surplus	2,000,000.00*
Cash Capital	6,000,000.00*
All Other Liabilities	19,395,766.42
Net Surplus	12,651,748.13*
Surplus as regards Policy-Holders	20,651,748.13*

Marine
Automobile
Windstorm
Parcel Post
Registered Mail
Sprinkler Leakage

FIRE

Tourists' Baggage
Use and Occupancy
Commissions
Profits
Rents
Hail

STRENGTH

CONFLAGRATION PROOF

FIRE PREVENTION

SERVICE TO AGENTS AND PROPERTY OWNERS

DEP'T OF IMPROVED RISKS

ENGINEERING AND INSPECTIONS

CONSULTATION AND ADVICE, GRATIS
CORRESPONDENCE SOLICITED

REPUTATION SERVICE

Remember You Saw This in Safety Engineering

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A long clean unbroken record

For 107 years the records of the stockholders' meetings of the Hartford Fire Insurance Company of Hartford, Conn., have been kept in the same little book that is now carefully preserved in the safety vaults of the Company. This little volume tells the story of the Hartford from 1810 to the present time. It records the growth of a great insurance corporation that at the close of business on December 31, 1916, had paid out in losses $198,044,354.97, and is financially impregnable. Such is the long, clean, unbroken record back of the

INSURANCE *Service* OF THE TWO HARTFORDS

The Hartford Fire Insurance Company and the Hartford Accident and Indemnity Company write practically every form of insurance except life insurance. For over a century Hartford losses have been fairly met and promptly paid. The Hartford was founded by empire builders—men of the same character and affiliations as the founders of the United States. The Hartford has grown great, as the country has grown great, by steadfast adherence to the traditional integrity of its founders. Are you fully insured? Look over the list below and check the forms of insurance which interest you. Ask your agent or broker to get you a Hartford policy, or write to us and we will tell you the name and address of an agent who can give you rates and particulars.

The Hartford Fire Insurance Co.
The Hartford Accident and Indemnity Co.

Hartford Fire Insurance Company, (Service Department F-6), 125 Trumbull Street, Hartford, Conn.

Gentlemen: Please send information on the kind of insurance checked and name of Hartford agent to the name and address written on margin of this coupon.

- ☐ Fire
- ☐ Rent
- ☐ Use and Occupancy
- ☐ Sprinkler Leakage
- ☐ Explosion
- ☐ Tornado
- ☐ Hail
- ☐ Automobile
- ☐ Motor Cycle
- ☐ Tractor
- ☐ Merchandise in Transit
- ☐ Mail Package
- ☐ Registered Mail
- ☐ Samples and Baggage
- ☐ Art Exhibitors
- ☐ Marine Insurance
- ☐ Accident and Health
- ☐ Burglary and Theft
- ☐ Plate Glass
- ☐ Workmen's Compensation
- ☐ Employers' Liability
- ☐ Elevator Liability
- ☐ Teams Liability
- ☐ Doctors' Liability
- ☐ Druggists' Liability
- ☐ Public Liability
- ☐ Landlords' Liability
- ☐ Fidelity and Surety Bonds
- ☐ Golfers'
- ☐ Live Stock
- ☐ Race and Show Horse
- ☐ Dairy Herds

Remember You Saw This in Safety Engineering

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"CHILDS" EXTINGUISHER

APPROVED FEB. 15th, 1902.

THERE ARE OVER 2000 USED BY THE

PANAMA CANAL

40 GAL. COPPER TANK CHEMICAL ENGINES FOR HOTELS AND FACTORIES.
CHEMICAL TANKS BUILT SPECIAL FOR FIRE DEPARTMENT APPARATUS.

O. J. CHILDS COMPANY - - UTICA, N. Y.

MANUFACTURERS FIRE APPARATUS.

1849 1917

Springfield

Fire and Marine

Insurance Company

SPRINGFIELD, MASSACHUSETTS

LARGEST FIRE INSURANCE COMPANY

CHARTERED BY THE STATE OF MASSACHUSETTS
INCORPORATED 1849 CHARTER PERPETUAL

CASH CAPITAL $2,500,000.00

OFFICERS

A WILLARD DAMON, President
WILLIAM J. MACKAY, Vice-President
GEORGE G. BULKLEY, 2nd Vice-Pres't
EDWIN H. HILDRETH, Secretary
PRIOLEAU ELLIS, Assistant Secretary
FRANCIS H. WILLIAMS, Treasurer

LOSSES PAID SINCE ORGANIZATION.....$68,836,946.84

James Peters & Son

1934-38 N. Front St., Philadelphia

We manufacture Sliding and Swinging Fire Door hardware for all kinds of Fire Proof Buildings.

Approved by the Underwriters' Laboratories, Inc.

Send for descriptive literature.

BERNARD H. EIDEL
New York Agent

445 Canal St. New York

Remember You Saw This in Safety Engineering

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McNUTT
Non-Explosive
SAFETY CANS
Prevent Explosions and Fires

Protect Your Men and Property

Workmen, no matter how careful, may at any time endanger lives and property while handling gasolene, benzine, naphtha, etc. You can eliminate this hazard from your factory by supplying your men with

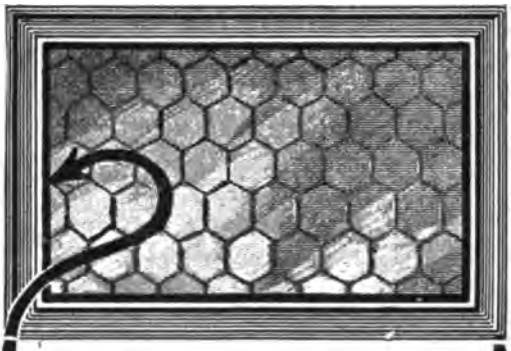
McNutt Safety Cans

We manufacture Safety Cans for all industrial requirements, and also make special cans to meet any unusual demand. McNutt Cans are approved by Underwriters' Laboratories and are in use in many of the largest industrial establishments in the country. The leading features of McNutt Cans are reliability, efficiency and economy in cost.

Send for Complete Catalog

McNUTT CAN SALES CO.
254 Church St, New York

Exhibitor National Exposition Safety and Sanitation, New York, September, 1917.



Fire Prevention Experts Demand

JOHN MARX FIRE RESISTING PUTTY

In Wireglass Windows

JOHN MARX
FIRE RESISTING PUTTY

Approved by
Underwriters' Laboratories, Inc.

Will double the durability of your Fireproof Windows

Ordinary putty should never be used in wireglass windows.

John Marx Fire Resisting Putty overcomes all the objections fire preventionists have against ordinary putty.

Resists for indefinite periods all conditions of actual service; withstands exposure to high temperatures; remains in the grooves after exposure to severe fire and subjection to action of fire-hose streams.

Post yourself on the best putty for all glazing purposes. Send for descriptive folder and list of buildings where "John Marx Putty" has proved its worth.

Manufactured by
JOHN MARX
54-56 Paterson Ave., Hoboken, N. J.

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"KOVEN"

OILY WASTE CAN

positively the best made. Endorsed by Underwriters' Laboratories, Inc., and Associated Factory Mutual Fire Insurance Companies.

These oily waste cans should be in every manufacturing plant in the United States.

L. O. KOVEN & BROTHER

154 Ogden Avenue
Jersey City, N. J.

"STRONG AS THE STRONGEST"

The Northern Assurance Co.

LTD. OF LONDON

ORGANIZED - - - - - - 1836
ENTERED U. S. - - - - - - 1854

Losses Paid $105,000,000
Losses Paid in U. S.....38,000,000

Eastern and Southern Departments
55 John Street, New York

THE LEADING FIRE COMPANY OF THE WORLD

ROYAL INSURANCE COMPANY LIMITED

[of Liverpool, England.]

New York Office, 84 William Street

HEADQUARTERS FOR ELECTRIC & PORTABLE
WATCHMAN'S CLOCKS
E. O. HAUSBURG, 45 MAIDEN LANE, N.Y.
WRITE FOR CATALOGUE AND PRICES

SAFETY ENGINEERING

$3.00 Per Year

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APPROVED APPLIANCES FOR FIRE PROTECTION

For the past 25 years we have specialized in supplying approved fire protection needs, including the Safety Fire Bucket Tank, Safety Fire Extinguishers, Safety Chemical Engines, Underwriters Linen and Cotton Rubber-Lined Fire Hose and equipment, Fire Axes, Fire Escapes, Pails, Safety Cans, Valves, Watchman's Clocks, Wire Glass, First Aid Kits, Packing Bins.

The Safety Fire Bucket Tank

Improved system of Fire Buckets. Six buckets with self-raising handles nested and submerged in Iron Tank containing 25-40 gallons chemical solution.

Does not evaporate
Does not foul
Does not freeze

Takes up only 15½ inches floor space. Requires no attention. Always ready for immediate use.

Made of heavy black iron sheets, all galvanized after being made.

Accepted and Preferred in Place of Fire Pails and Casks and are Endorsed by the Underwriters Laboratories (Inc.), Chicago.

SAFETY FIRE EXTINGUISHER CO.,
W. E. Liptrott **291 Seventh Ave., New York**
Telephone, Farragut 3356-3357

Every Employer, Property Owner, Fire Insurance Engineer, Liability and Compensation Insurance Inspector, Fire Preventionist, Accident Preventionist, Architect and Contractor needs

"SAFETY ENGINEERING"

The Magazine of Fire and Accident Prevention

$3.00 PER YEAR

Club Rates on Application. Send for Sample Copy

Exhibitor National Exposition Safety and Sanitation, New York, September, 1917.

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You May Be Next

Fire—Water
Falling Walls

Are You Protected

THE SAFE-CABINET SCIENTEST MODEL

Will Bring Records Through Unharmed

Men are awakened by destruction. It seems to require misfortune to rouse them to their own lack of security. A large percentage of fire insurance is sold after fires; every disaster results in the writing of large accident insurance policies.

Our own experiences prove that many men ignore their need of protection until fire has wiped out their valuable records, documents, etc., which were so necessary to their success and prosperity. But—

Why Do You Take This Risk?

And why do you permit others to take it? No matter what the business or profession may be; no matter what the filing requirements, there's a SAFE-CABINET adapted to the safeguarding of all records and valuables.

Every conceivable test has been given THE SAFE-CABINET by both laboratory and grim experience, but the result is repeatedly the same—unharmed contents.

Get This Documentary Evidence

We've compiled a very interesting book on fire protection that should be in the hands of every Safety Engineering reader. It contains details of scientific tests and actual experiences that have placed THE SAFE-CABINET on a plane all its own.

See the signed statements of SAFE-CABINET owners whose records have been saved in fires where all other means failed.

The book is FREE. *Your* copy will be sent upon receipt of coupon. Get it now—TODAY.

THE SAFE-CABINET CO.
49 GREEN ST., MARIETTA, O.
Originators and Sole Manufacturers of THE SAFE-CABINET

THE SAFE-CABINET COMPANY,
49 Green St., Marietta, Ohio.

Please send, without delay, your book "Written in Letters of Fire."

Name .....

Business .....

Address .....

Shall we send data on THE SAFE-CABINET for home use? .....

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Blankets of Fire-Smothering Foam

ARE PROVIDED BY

Foamite

NOW PROTECTING MORE THAN FIVE THOUSAND LARGE OIL STORAGE TANKS FOR THE LEADING OIL PRODUCERS AND REFINERS.

FIRES IN 55,000-BARREL TANKS OF GASOLINE STRUCK BY LIGHTNING HAVE BEEN EASILY EXTINGUISHED BY FOAMITE.

THE SAME REMARKABLE FIRE-FIGHTING EFFICIENCY IS NOW AVAILABLE IN FOAMITE PORTABLE APPARATUS.

Foamite FIRE EXTINGUISHERS, 3-Gallon Size

Foamite FIRE PAILS, 3-Gallon Size

Foamite FIRE ENGINES, 20, 40 and 60-Gallon Sizes

Foamite FIRE APPARATUS is The Most Efficient Extinguisher of OIL FIRES and ALL FIRES. It can be used anywhere, outdoors and indoors, as it liberates no suffocating fumes or noxious gases.

Foamite FIRE EXTINGUISHING GASES cannot be blown away by wind or sucked away by draft, as they are held in fine bubbles making a tough, long-lasting FOAM which adheres to any burning surface.

Foamite FIRE APPARATUS is The Most Efficient for Extinguishing Fires in Oil, Gasoline, Paint, Varnish, Grease, etc., because the FOAM FLOATS on such volatile materials and forms a permanent Fire-Smothering Blanket.

Foamite FIRE APPARATUS is The Most Efficient for Extinguishing Fires in Solid Materials, such as Wood, Cloth, Paper, etc., because the FOAM COATS such substances, smothering the fire and making its re-ignition difficult.

Foamite FIRE APPARATUS places all its fire-smothering gases on a fire, and KEEPS THEM THERE!

Foamite CHEMICAL CHARGES are cheap, easily obtained, do not deteriorate, contain no sulphuric or other dangerous acid, and are easy and absolutely safe to handle.

Foamite FIRE PROTECTION CAN NOW BE HAD IN THE FORM BEST SUITED TO YOUR SPECIAL NEEDS.

WRITE TODAY FOR DESCRIPTIVE BOOKLET

Foamite Fire Extinguisher Company

No. 190 Fifth Avenue Building - - NEW YORK CITY

Exhibitor National Exposition Safety and Sanitation, New York, September, 1917.

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"THE FIRE EXTINGUISHER **MINIMAX** THAT EXTINGUISHES"

Minimax "HAS" put OUT more than 50,000 FIRES.

It is the STANDARD in Europe. Automatic and quick of action, absolutely reliable and fool-proof. NO incipient fire can get away from it.

THE CHEMICAL CHARGE IS PERFECTLY HARMLESS TO FLESH OR FABRIC

Ask your Chemist or Doctor before you buy.

Hanging on Brackets furnished. They are easily and quickly accessible.

Demonstrations Given Upon Request

IT GENERATES NO HARMFUL AND OBNOXIOUS GASES AND FUMES.

NO PUMPING OR TURNING UP-SIDEDOWN; ONE HAND ONLY IS NECESSARY TO OPERATE MINIMAX.

MADE IN TWO CONVENIENT SIZES:

TYPE "B" 2½ GALLON FOR THE FACTORY.

TYPE "A" 1½ GALLON FOR THE HOME.

MINIMAX IS THE ONLY "FIRST COST ULTIMATE COST" EXTINGUISHER IN EXISTENCE

WRITE FOR PRICES AND TESTIMONIALS TO

MINIMAX COMPANY, 63 WALL STREET, NEW YORK

POMEROY FIRE RETARDANT WINDOWS

Not Made to Meet a Price, but to Set a Standard of Service

S. H. POMEROY COMPANY

Incorporated

30 East 42nd Street **New York**

Remember You Saw This in Safety Engineering

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SMALL FIRES
START BIG FIRES

INDEPENDENT

SPRINKLERS

STOP ALL FIRES

While Guarding Yeur Plant They Pay Fer Themselves

WRITE US

INDEPENDENT SPRINKLER CO.

2325 N. 11th STREET, PHILADELPHIA

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THE SAMSON

A NEW FIRE ALARM SYSTEM FOR THE PROTECTION OF ALL CLASSES OF BUILDINGS

Signal Station Closed

The only complete manually operated closed circuit electrically supervised BATTERY system approved by N. Y. authorities.

BOXES

The Samson Manually Operated Fire Alarm Box can be used on battery, alternating or direct current.

Control Cabinet

CONTROL BOARD

The Control Board is enclosed in steel cabinet, contains Relays, Cut Out and Apparatus for supervising and operating system.

BELLS

Only single stroke bell which can be operated by Battery, AC or DC. The armature has a strong pull during entire length of stroke —which insures powerful ringing of bell.

BATTERY

The well known Samson Battery designed for close circuit work especially suitable for Samson Fire Alarm System.

Source of Energy

Samson Electric Co.

Established 1882

Canton, Mass.

Single Stroke Bell

Remember You Saw This in Safety Engineering

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PYROLIN
STOPS FIRE

GEO. A. BRYANT, Pres.

WONDER PAPER COMPANY

MANUFACTURERS OF

WATERPROOF PAPER AND FABRICS

Chicago, Ill., May 9th, 1917.

The Pyrolin Company,
Fort Dodge, Iowa.

Gentlemen:

Replying to your inquiry regarding the Pyrolin Fireproof Paint which you furnished us, will say that I should be glad to have you refer anyone to me concerning it, as it will give us sincere pleasure to endorse the product.

We have not only painted the exposed woodwork in our factory with your Factory White, but we have also painted our dryer inside and out, and find that the intense heat does not affect the paint at all.

To satisfy the Insurance people we cut slivers from the framework and tried to ignite them, and found it an impossibility. This saved us from having to line our dryers with steel or concrete.

Shall be glad to give your product an endorsement at any time.

Very truly yours,
WONDER PAPER COMPANY,
GHB/SB Geo. H. Bryant. (Signed)

Made only by The Pyrolin Company, Fort Dodge, Iowa

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DRAEGER

Breathing Apparatus

Instant Effective Response to the Cry for Help

Probably you have never had the misfortune of a disastrous fire, with its billows of blinding irrespirable smoke holding the firemen helpless while your property was being destroyed. Possibly an accident never occurred in your plant liberating deadly gases or fumes, overcoming faithful employees, and preventing rescue and salvage work.

But the possibility of a disaster of this sort is ever present, and the safety of your plant, the security of your company's progress, and the lives of your men demand you guard yourself with the protection of Draeger Apparatus.

Draeger Breathing Apparatus will enable you to fight any fire at its source, to penetrate the deadliest gases and smoke, work for hours at a stretch and return to fresh air in safety and comfort when your work is done. It has been recognized and approved as the most dependable and safe means for the protection wherever deadly and irrespirable gases are to be met with.

The U. S. Bureau of Mines alone has purchased 98 pieces of Draeger Apparatus. All the other Federal and State departments needing such equipment use that marked Draeger as do the leading chemical, metallurgical plants, mining companies and fire departments.

No matter what your need is, or conditions are, there is a Draeger Breathing Apparatus that will guard you against losses, and in most cases lower your insurance.

Don't wait for an accident. Write now.

The Draeger Oxygen Apparatus Co.

810 Hay Street, Wilkinsburgh Station, Pittsburgh, Pa.

AGENTS for The Wolf Safety Lamp Co. of America
MEMBERS of the National Safety Council
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16 June, 1917

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In reply to your letter of June fourth, allow me to say that I not only see no reason why commercial conventions should be omitted during the war, but should regret to see any instrumentality neglected which has proved serviceable in stimulating business and facilitating its processes. This is not only not a time to allow any slowing up of business, but is a time when every sensible process of stimulation should be used.

Cordially and sincerely yours,

Woodrow Wilson

Mr. E. P. V. Ritter, President,
Merchants and Manufacturers Exchange,
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SAFETY AND SANITATION

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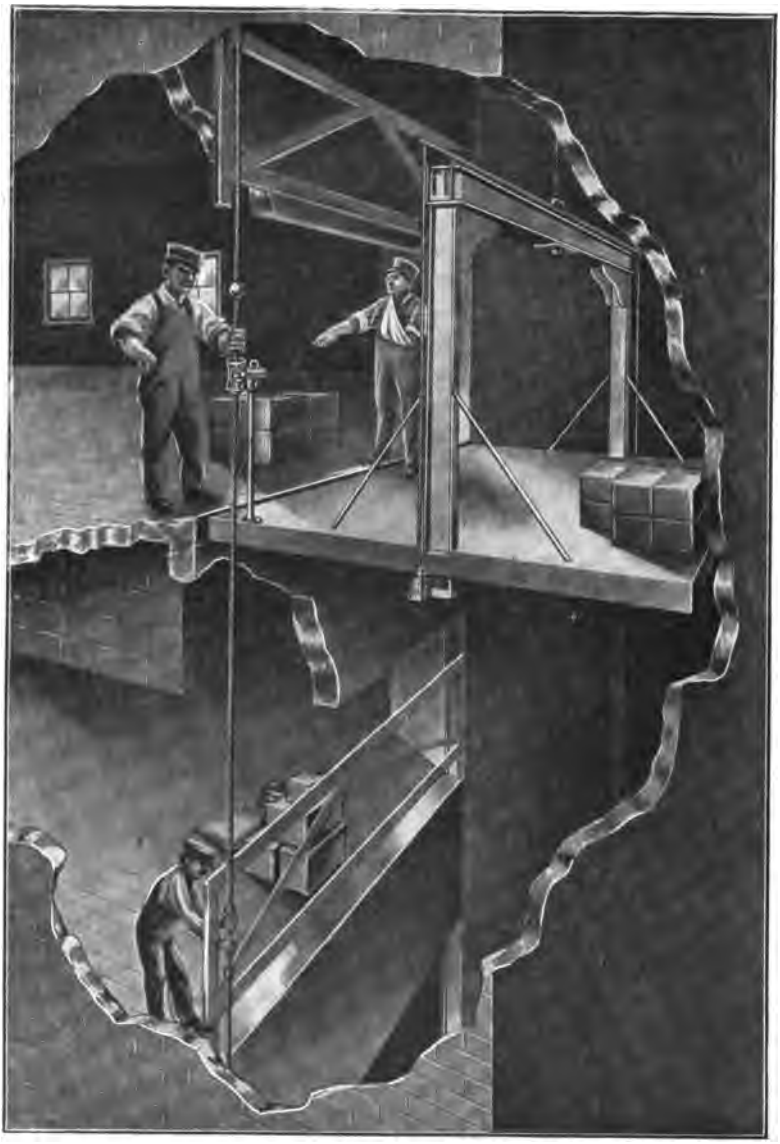

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